"A National Trade Journal"

TWENTY-SIXTH YEAR

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The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

Vol. XXVI. No. 4.
$2.00 a year. 30 cents a copy.

APRIL, 1929

Heating & Ventilating Magazine Co.
521 Fifth Avenue, New York.

The magnificent structures on Pittsburgh's changing skyline—*The Pittsburgher Hotel, Koppers Building* and *Keystone Athletic Club*, show the class of buildings in which ILLINOIS Heating Systems are found.

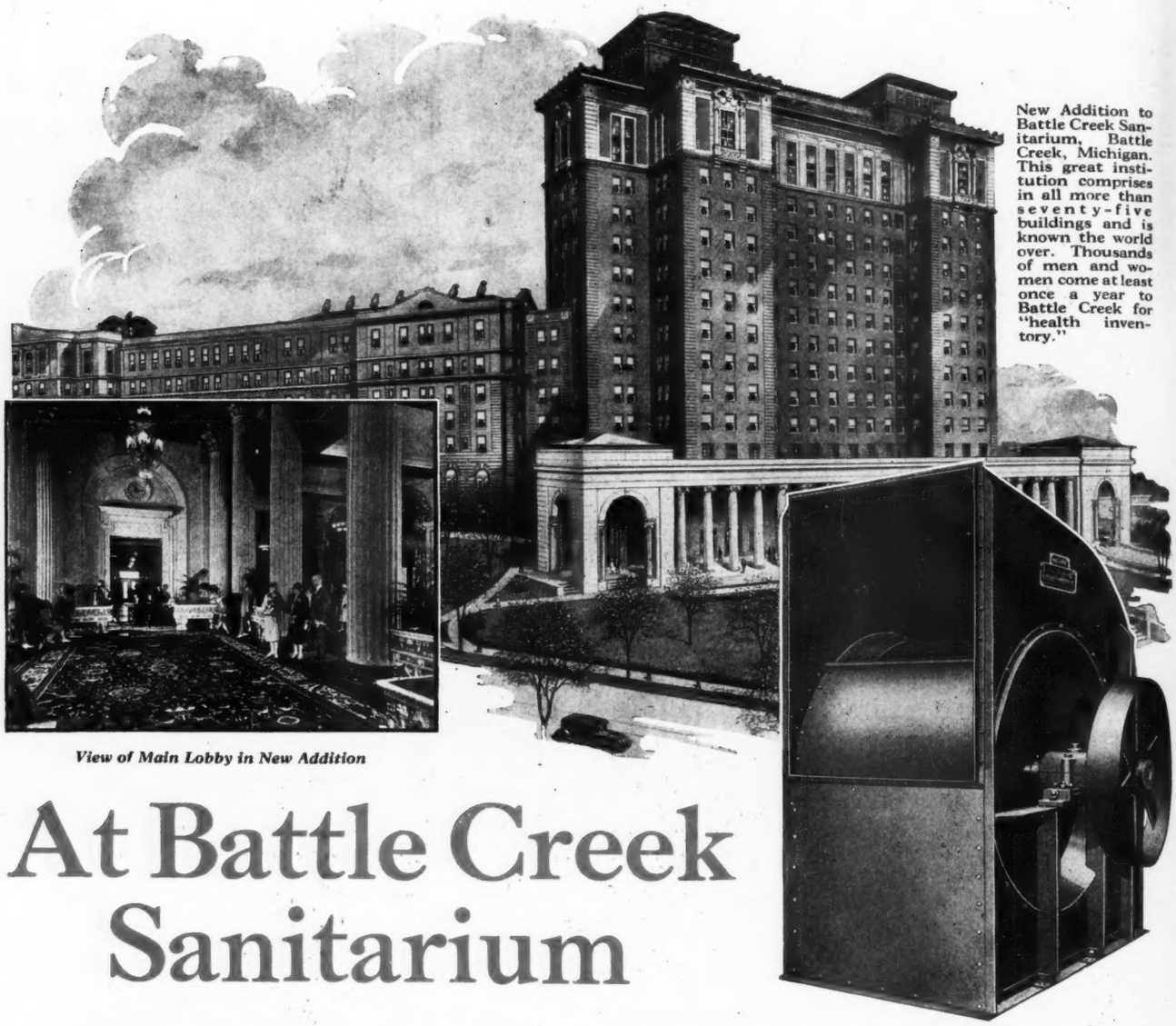
Pittsburgh Office: SCHLEY & NASH CO., Columbia Bank Building

ILLINOIS ENGINEERING COMPANY

ROBT. L. GIFFORD. PRES. INCORPORATED 1900

BRANCHES AND REPRESENTATIVES IN 40 CITIES

CHICAGO



New Addition to Battle Creek Sanitarium, Battle Creek, Michigan. This great institution comprises in all more than seventy-five buildings and is known the world over. Thousands of men and women come at least once a year to Battle Creek for "health inventory."

View of Main Lobby in New Addition

At Battle Creek Sanitarium

FOR Ventilation in this marvelous new fifteen-story addition to the Battle Creek Sanitarium, Clarage Type HV Multiblade Fans are used exclusively. A total of nine fans are in operation, handling approximately 102,400 cubic feet of air per minute.

None other in the long list of Type HV Fan installations pays higher tribute to Clarage engineering and equipment; because here at Battle Creek everything is scientifically planned for health-building, and no other factor received closer attention than the problem of adequate ventilation and the equipment necessary to produce it.

There are sound reasons why Type HV Multiblade Fans enjoy a national preference. Aside from their unparalleled maximum efficiency of 77%, they are built for unfailing service with remarkably little attention.

The bearings are the finest offered: extra large; self-aligning in all planes; ring-oiling; dust-proof and oil-tight. The fan wheels are given both a static and running balance test—free from vibration. The bearing supports extend to the foundation line. In fact, nothing has been slighted to make the Type HV Fans dependable, smooth-running, quiet units.

We will be glad to mail you Catalog 54, giving complete details and capacities on the large range of sizes available; or write for the co-operation of the nearest Clarage engineer—no obligation.

CLARAGE FAN COMPANY
KALAMAZOO, MICHIGAN
Sales Engineering Offices in Principal Cities

CLARAGE

TYPE HV MULTIBLADE FANS—77% EFFICIENT

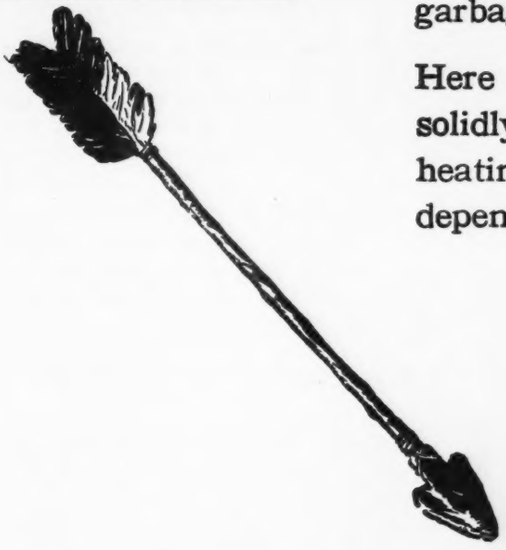
KEWANEE

Water Heating GARBAGE BURNERS

The By-Pass (a distinctive Kewanee feature) prevents the garbage from smothering the fire—the flames circulating thru it and around the garbage until the refuse is dry enough to burn.

Every building must have hot water, and the most economical method of getting it is by using rubbish and garbage as part of the necessary fuel.

Here is a real Kewanee Product—solidly built of steel, riveted. A water-heating garbage burner as strong and dependable as Kewanee Boilers.



Three types—fourteen sizes to heat from 200 to 2600 gallons per hour

Catalog 75 gives details

KEWANEE BOILER CORPORATION

Kewanee, Illinois *Branches in 40 Principal Cities*

STEEL HEATING BOILERS RADIATORS WATER HEATERS
TANKS AND WATER HEATING GARBAGE BURNERS

THE HEATING AND VENTILATING MAGAZINE, published by NATIONAL TRADE JOURNALS, INC., at 521 Fifth Avenue. New York, N. Y. Subscription rates: United States, $2.00; Canada, $2.50; Foreign, $3.00. Single copies, 30 cents. Vol. XXVI, No. 4, April, 1929. Entered as second-class matter, April 18, 1925, at the Post-Office at New York, N. Y., under the Act of March 3, 1879.

The tremendous waste of heat which would occur in utilizing Vesuvius to boil a kettle of water illustrates the heat losses resulting from insufficient heating surface in a boiler. The Pacific design puts the maximum of heating surface in direct contact with the maximum of fire area.

A tea kettle over Vesuvius

A tea kettle over Vesuvius is an appropriate symbol for unscientific ratios between direct heating surface and boiler grate area. A pan of water only half covering a gas flame is another. Lack of sufficient heating surface means fuel thrown away.

Engineering authorities, in stating the correct ratio as 30 to 40 square feet of heating surface per square foot of grate area were not actuated by whim. They *tested* and tested *again* to find the point of highest efficiency in boiler heat transmission. And it is at this point that the heating surface in the Pacific is fixed.

Likewise, ratios between direct and indirect heating surfaces, are standard in Pacific design and construction. The engineer, the architect, the builder are *guaranteed* in the Pacific a heating efficiency as high as cold mathematics and expert brains can make it.

PACIFIC

STEEL HEATING BOILERS

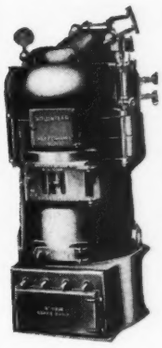
AND CAPITOL RADIATORS MAKE A LOGICAL COMBINATION

Correctly balanced heating surfaces form one of the reasons for Pacific's dominance in the heating industry. Others are its large combustion space, positive circulation, and its rugged welded construction, the latter being Pacific's own contribution to the heating industry.

Write or wire for literature on the type of installation required for your next job. A Pacific will fit it.

PACIFIC STEEL BOILER CORPORATION
Factories: Waukegan, Ill., Bristol, Pa.
Sales Offices in 58 Cities
Division of the United States Radiator Corp., Detroit, Mich.

Page *for* Better Boilers

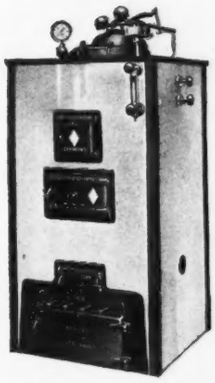


Volunteer Boiler, for home heating.

Page has been building dependable heating boilers for the past 70 odd years, and many of our earlier boilers still survive in old buildings that somehow have escaped demolition—literally a life-time of service.

Of course, as the industry progressed, Page Boilers underwent many changes and are now in improved form built in a modern plant with the newest precision machinery.

But in one important respect they remain unchanged. The old-fashioned generosity of three-level, horizontal, fire travel still to be found in the Page Monarch is your assurance of an efficient, fuel conserving plant, and a satisfied client.



Red Diamond Jacketed Boiler, to dress up your job.

Let us send you our Red Diamond Display Poster in colors

Monarch Boiler, 22″, 28″, 40″ and 60″ Series, a wide range to take care of all your jobs, no matter how large they come.

Write us for your copy of new 1929 catalogue and prices

The Wm H Page Boiler Co

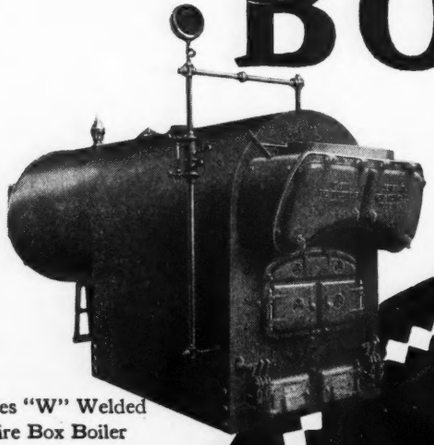
Branch Offices and Warehouses:

Boston, 123 Beverly Street
Philadelphia, 1126 Washington Ave.
Cleveland, Rose Building
Washington, 1117-15th Street, N.W.
Baltimore, 502 St. Paul Street

Factory: Meadville, Penna.

General Offices: 200 Madison Avenue, New York City

THE 1929 LINE of TITUSVILLE BOILERS



Series "W" Welded Fire Box Boiler

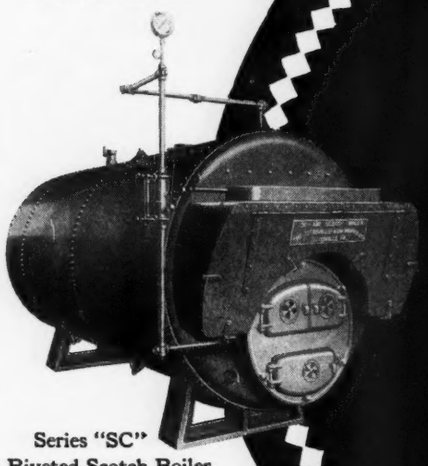
Series "WS" Welded Smokeless Boiler

for Every General or Specific Requirement

Titusville Boilers need no introduction. Their reputation for efficiency and economy is nationwide. Thousands are used in the nations foremost industries for every conceivable purpose.

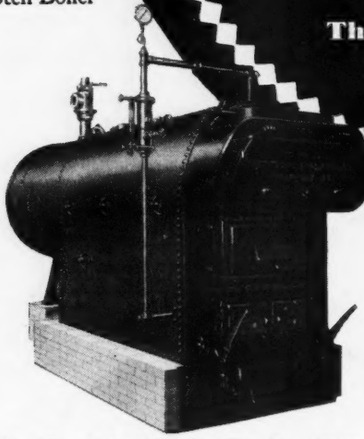
No matter whether you require a boiler for power or heat, no matter whether you prefer riveted or welded construction, you will find the answer to your need in the complete 1929 line of Titusville Boilers as fully described in the various Titusville Catalogues. Send for catalogues on the particular types of boilers you are interested in.

The Titusville Iron Works Co.
Titusville · Penna.

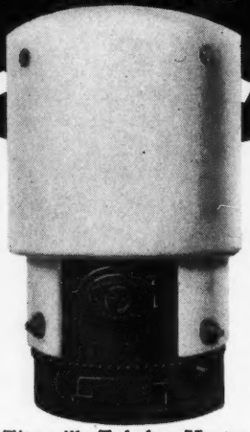


Series "SC" Riveted Scotch Boiler

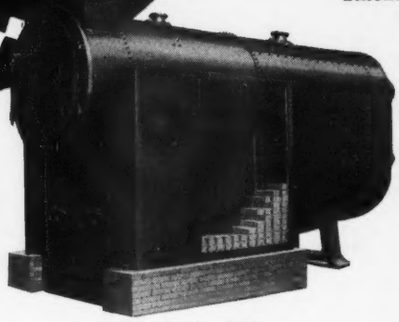
Perfection Smokeless Boiler



Tico Smokeless Riveted Fire Box Boiler



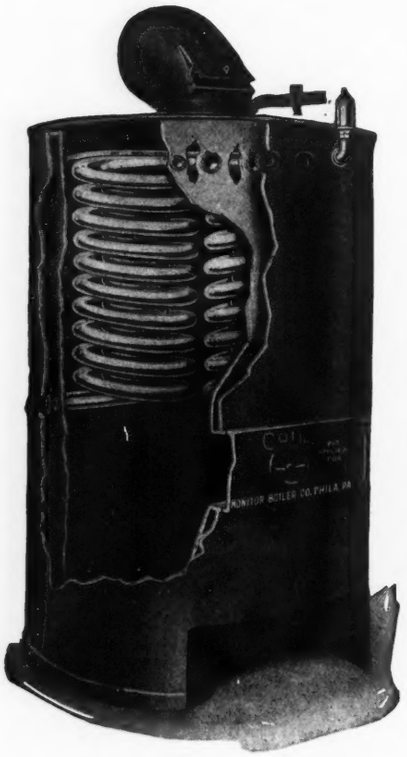
Titusville Tubeless Heater



Perfection Boiler

ROSS STEEL BOILERS

FOR OIL BURNING



We have hundreds of letters on file from leading heating contractors all over the country. They are generous in their applause of The Coil Steel Boiler for Oil Burning. Perhaps you have wondered how you could solve the oil heating problem — make money yourself and save it for your customer. The Coil Steel Boiler is the answer. We can point out to you and prove its superiority for efficiency and fuel economy.

If desired, Coil Boilers can be fitted with grates, etc., in thirty minutes time.

Write and let us give you the absolute facts

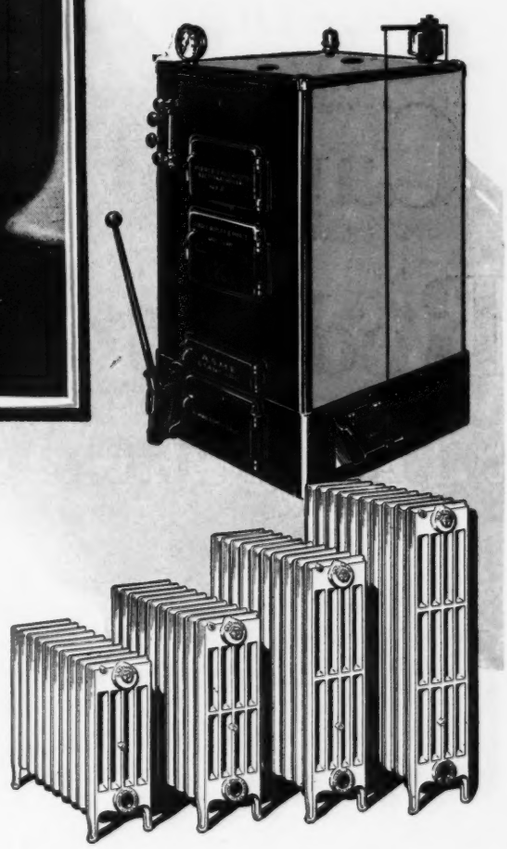
COIL

STEEL HEATING BOILERS AND WATER HEATERS

MONITOR BOILER COMPANY

1505 Race Street :: :: Philadelphia, Pa.

The New
PIERCE-EASTWOOD
Jacketed Boiler



Pierce-Eastwood Radiators are of screw-nipple construction — an absolute guarantee of perfect service . . . The use of heavy malleable iron screw-nipples between sections is conceded to be the most rugged type of radiator assembly. ~ ~ ~

Wire or write for ratings and specifications.

PIERCE BUTLER & PIERCE MANUFACTURING CORPORATION
41 East 42nd Street, New York, N. Y.

PIERCE-EASTWOOD
BOILERS AND RADIATORS

Coming!

Watch for the Announcement of the

Capitol Red Top

Copyright April, 1929, United States Radiator Corporation

SQUARE BOILER

in the

June Issues

of

Better Homes and Gardens

American Home **Arts and Decoration**

House Beautiful **Country Life**

United States Radiator Corporation - Detroit, Michigan

An Oil Burner For Every Purse and Purpose

Flamingo Hotel—Chicago, Hardinge Installation

Another one of America's Finest Hotels Equipped with Hardinge

Thirty-eight years of painstaking research and experience in the manufacture of precision-built instruments has brought a nation-wide recognition to the Hardinge line of oil burners. Heating and ventilating engineers are invited to look over the long list of prominent hotels and big buildings everywhere which are being efficiently and economically heated with the Hardinge fuel oil burner. Our two models, Domestic and Industrial, in 9 different sizes and combinations, enable specific treatment for every heating problem from bungalow to skyscraper. When you specify Hardinge you are specifying ten years of *absolutely guaranteed* oil heating efficiency.

HARDINGE FUEL OIL HEAT

Hardinge Brothers, Inc.

Factory and General Offices

4149 Ravenswood Avenue, Chicago, Ill.

Factory Branches: Chicago—Michigan Avenue at Ohio Street. Boston—843 Beacon Street.

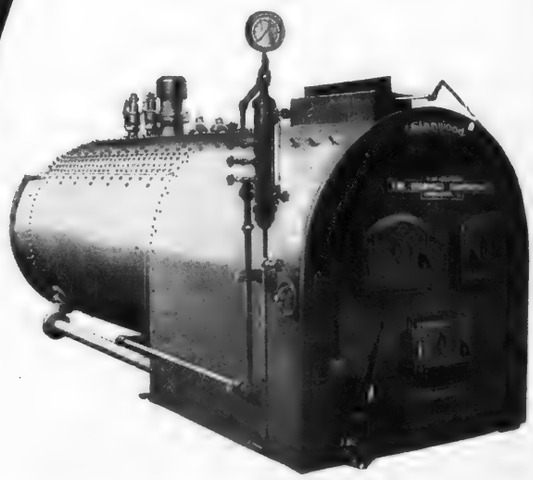
for Higher Efficiency The Answer

Higher Efficiency and the power to render Good Service over a number of years reduces maintenance costs. Stanwood Boilers have never been known to shirk.

Their rapid circulation arrangement eliminates almost entirely all heat insulators which retard quick steaming and increase coal consumption. Speedy water circulation prevents accumulation of sediment and increases boiler capacity. The water line of 48 to 75 inches necessitates little or no excavating. Begin to figure savings here. This compactness which permits economies in installation is why so many specifications read Stanwood Smokeless Boilers. Absence of outside brickwork further reduces installation costs. Ideally suited for heating application for which it is especially built. It will please you with lasting and dependable service.

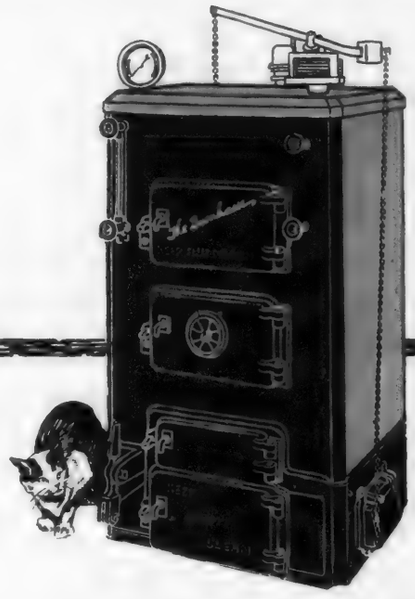
Write Dept. D-49 for complete information giving size and pressure desired. Built in sizes from 29 to 250 H.P. (3500 to 31,000 sq. ft. Steam radiation) for working pressures of 15, 100, 125, and 150 lbs. Built for higher pressures if desired.

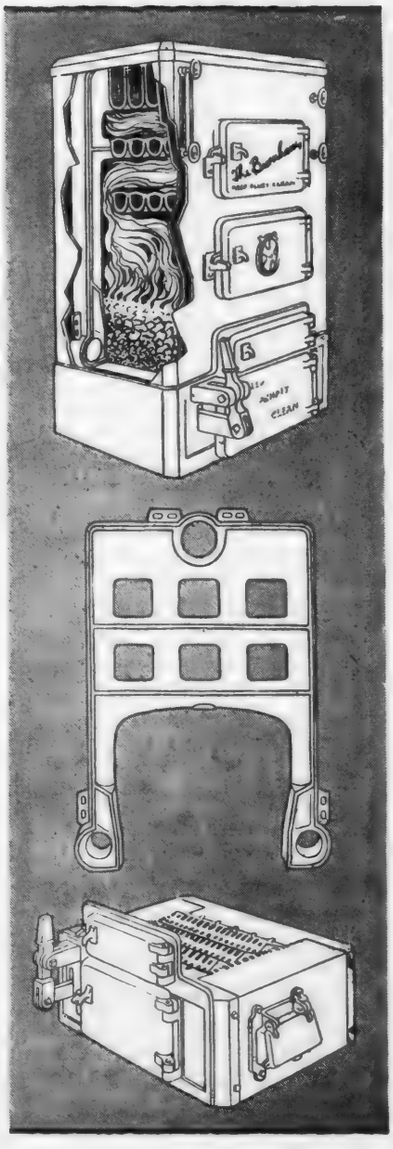
Manufacturers also of Horizontal Return Tubular Boilers, Stacks, Breeching, and Tanks. Est. 1891—Cincinnati, Ohio.



Stanwood Smokeless Boilers

THE NEW Burnham Boiler JACKETED IN COLOR





Now Let's See If This One Is "All Front and No Back"

LET'S rip off the mask—it's jacketed in color—and see what's behind this new Burnham. Let's see if it's a boiler made to suit a jacket? Or a boiler made to be the best boiler made; and then jacketed in keeping with such a boiler?

To find out, you won't have to take off its suit of clothes. It comes to you stark naked. Its fine Indian Red, enamel steel clothes are in a separate box. You put them on the boiler after it's up. They slip on as easy as a pair of fireman's boots.

Going on after the set-up and connections are made, the Burnham jacketed-in-color, is free from mars and pretty as a picture. That alone is one of your best selling points, wouldn't you say?

Burnham Boiler Corporation

IRVINGTON, N. Y.

Representatives in all Principal Cities of the United States and Canada

To make your underground steam mains safe and permanently tight

Welded underground or overhead mains can be made continuous and highly flexible by installing BADGER WELDING SELF-EQUALIZING EXPANSION JOINTS. They weld right into the pipe line of which they become an integral part.

The one piece, multi-corrugated expansion elements introduce no sliding joints. They are manufactured by special machinery that produces a uniform curvature and uniform thickness of metal throughout the corrugations. Heavy external equalizing rings, distribute the movement evenly among all the corrugations and protect the expansion element against wear. No packing is used and maintenance costs are therefore reduced to nothing.

Standard guide bearings for anchorage and keeping the pipe in alignment can be furnished. These bearings are bedded in concrete piers inside of the trench. For anchorages, the strap is welded to the pipe on both sides.

Guaranteed for all working pressures to 200 lb. Adapted to superheat when equipped with a telescoping Monel Metal sleeve.

Write for bulletin.

E. B. BADGER & SONS CO.

75 Pitts Street, BOSTON, MASS.

New York: 271 Madison Ave: Chicago: 2831 South Parkway

Representatives in all principal cities

BADGER Engineering Service Badger engineers are designers, manufacturers and installation experts for the following and kindred power plant products:—Pipe Bends, Chemical Apparatus, Copper and Sheet Metal Work and Copper Boilers.

BADGER EXPANSION JOINTS

ESTABLISHED 1841 · WEATHER VANE ON FANEUIL HALL · E.B. BADGER & SONS COMPANY · TRADE MARK

MISSOURI PACIFIC BUILDING
St. Louis, Missouri

Architect, E. M. Tucker; *Engineer*, E. A. Hadley; *Plumbing Contractors*, The De Bord Company; *Heating Contractors*, Bradley Heating Company.

The Spirit of St. Louis . . .

THE will of a great city—to go ahead. Here one finds a determination to build greater—to expand—to do real things—a typical American populace. St. Louis, on the tongue of the world, interprets modern progress. From here went, with unflinching bravery, the mighty Lindbergh—symbolic of the spirit of her people. St. Louis looks ahead—prepares—builds well. Thus, in selecting the materials for her modern buildings—choice is the natural result of a "do it well" spirit—quality being the major consideration. The Missouri Pacific Building with its towering lines of beauty and stability faithfully exemplifies, in building measures, the spirit of this great city. Translated into practical terms, it means—care and precision in specifications. The architects, engineers and contractors responsible realized their task and met it. Thus, for the major pipe tonnage they selected "NATIONAL" Pipe—typical of progress and leadership in building materials. To resist corrosion—particularly pitting—butt-weld sizes ½ to 3-inch are made by the special Scale Free Process—an exclusive "NATIONAL" pipe feature.

NATIONAL TUBE COMPANY • Pittsburgh, Pa.

***Subsidiary of* United States Steel Corporation**

Will You Take a Few Minutes to Increase Your Income?

Scores of heating men have found a new source of profit in Electrol's co-operative proposition. Requires no investment...adds nothing to overhead on your present business

HEATING men all over the country have found a way to increase their incomes without changing their present business and without additional investment or capital. All that is needed is a few minutes to read this and a few minutes more to talk with the local Electrol dealer.

The plan is a cooperative proposition which benefits you and the Electrol dealer. You simply make working arrangements with him whereby you profit from Electrol sales made to your customers.

The plan does not require you to become an oil burner dealer — that's a specialized business in itself. Nor does it require any time or effort on your part. The Electrol dealer will work in full accord with you, selling and installing the burner entirely under your direction.

Oil the Accepted Heat; Electrol the Accepted Burner

With public acceptance of the oil burner now definitely accomplished, more and more homes will be heated by oil. And with a reputation for excellence and dependability already fully established, Electrol is more often than not the home builder's choice of burner. Sales are made before you make your recommendations.

The engineering principles and refinements of Electrol have played an important part in bringing about general acceptance of oil as a better fuel for heating homes and buildings of all types and sizes.

Electrol is Electrically Controlled and Electrically Operated, providing absolute dependability of operation under all conditions and eliminating the need for a gas pilot light. A small, low-current-consumption motor furnishes the power. An electric thermostat hold the temperature uniform... The burner's operation is Entirely Automatic, Quiet, and Economical.

Through every hour, night and day, *The Master Control* stands watch, timing the ignition, regulating the flow of oil, governing combustion and providing a never-failing automatic check on every operation.

The Electrol Dealer can Explain the Whole Plan in a Few Minutes

More than likely, there is an Electrol dealer in your city or near you. He will be glad to explain how easily you can work together for your mutual benefit and profit. You will find him pleasant to deal with — a progressive business man.

He will be fair and conscientious in his statements and his work. He will not overstate the possibilities of Electrol... He does not have to.

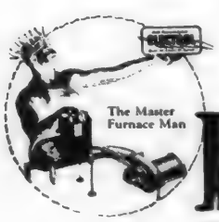
If you do not have his name and address, write us. No obligation, of course.

Ask for details at the Oil Burner Exposition

Electrol will be represented at the Oil Burner Exposition held in conjunction with the annual convention of the American Oil Burner Association, Hotel Pennsylvania, New York City: April 9, 10 and 11.

Heating men who attend can get full particulars of the Electrol Co-operative Plan at the Electrol exhibit.

BOOTH 28-29



ELECTROL INCORPORATED
177 Dorcas St. • • St. Louis, U.S.A.

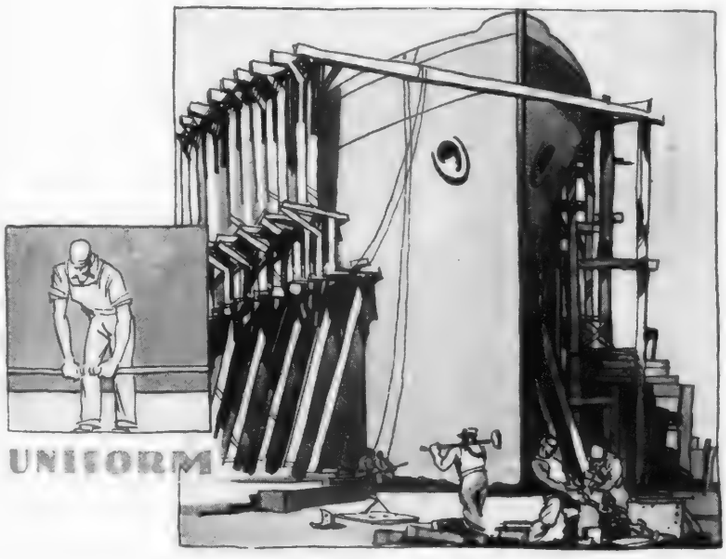
ELECTROL

The OIL BURNER with *The Master Control*

LISTED AS STANDARD BY THE UNDERWRITERS' LABORATORIES, AND BEARS THEIR LABEL. MEMBERS OF THE OIL HEATING INSTITUTE.

ON THE JOB

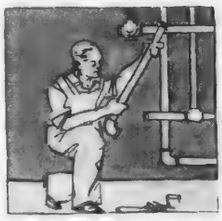
~EASY~
THREADING



UNIFORM

Since
1828

Whenever you require good, dependable pipe, whether it be for a house or a ship, a power plant or what not, think of Etna—the welded steel pipe backed by a century of skilled manufacturing experience.



ACCURATE

SPANG, CHALFANT & CO., INC.

General Offices: **Clark Building, Pittsburgh, Pa.**

Sales Offices: Chicago, Ill., New York, N.Y., St. Louis, Mo., Pittsburgh, Pa., Tulsa, Okla., Los Angeles, Cal. *Mills:* Etna, Sharpsburg, Ambridge, Pa.

ETNA WELDED STEEL PIPE

The Dunham Differential Vacuum Heating System

Baltimore Trust Co. Building
Baltimore, Md.

TO the rapidly growing list of outstanding skyscrapers to be heated by a Dunham Differential Vacuum Heating System is added Baltimore's new 34-story banking house.

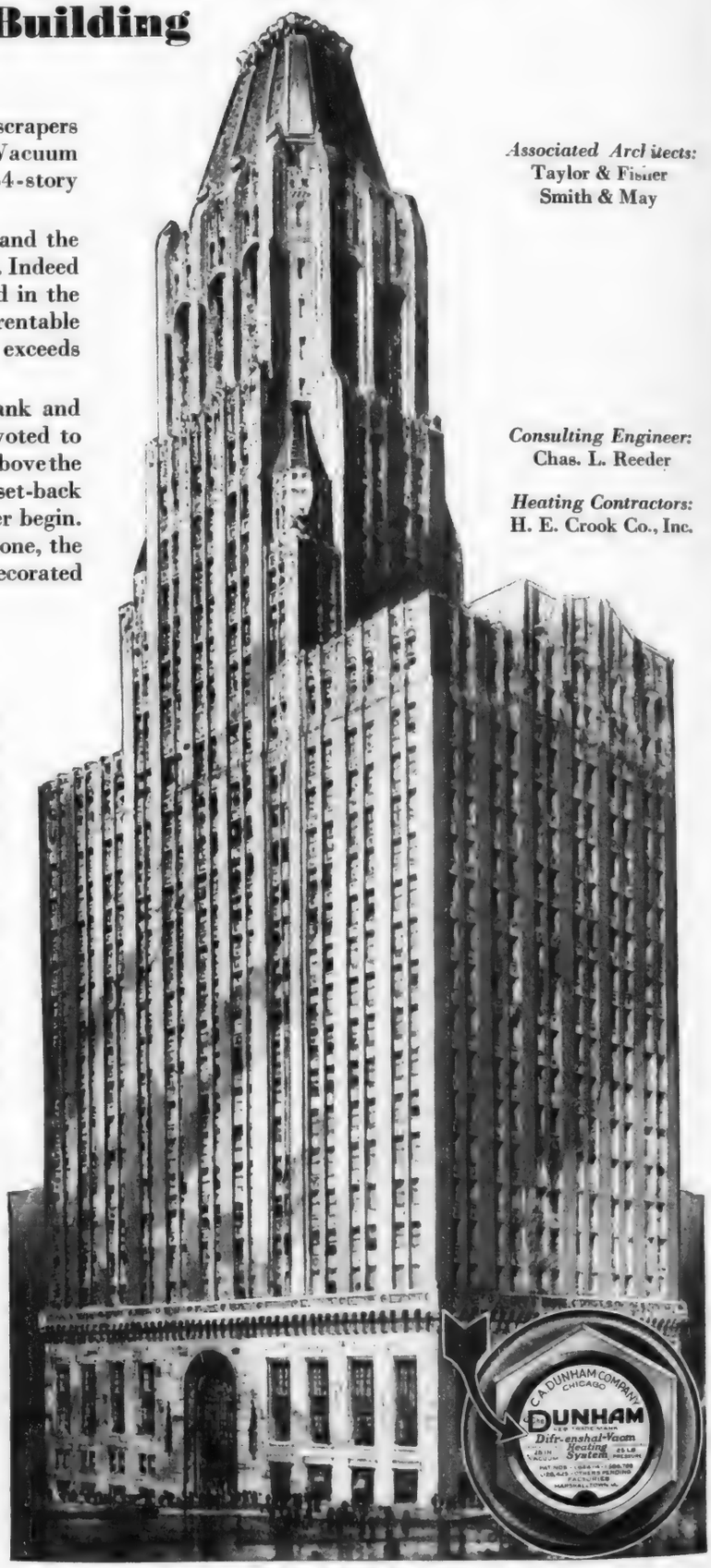
The structure will be the tallest in the city and the highest building south of the Mason-Dixon Line. Indeed it is said that its height of 484 feet is exceeded in the South only by the Washington Monument. The rentable floor space of more than 200,000 square feet exceeds that of any other building in the city.

The first floor will be given over to the Bank and stores. Three mezzanine floors will also be devoted to banking. Seventeen typical office floors will rise above the banking section. At this point there will be a set-back where the thirteen additional floors of the tower begin. The exterior of the first four floors will be of stone, the remainder of the structure to be of brick decorated with stone.

Associated Architects:
Taylor & Fisher
Smith & May

Consulting Engineer:
Chas. L. Reeder

Heating Contractors:
H. E. Crook Co., Inc.



Dunham Differential Vacuum Heating System to be Installed

Steam will be generated in the central portion of the basement. The distributing system provides separate mains for feeding the hot water storage equipment and blast radiation. It also provides separate mains for feeding direct radiation in the several zones.

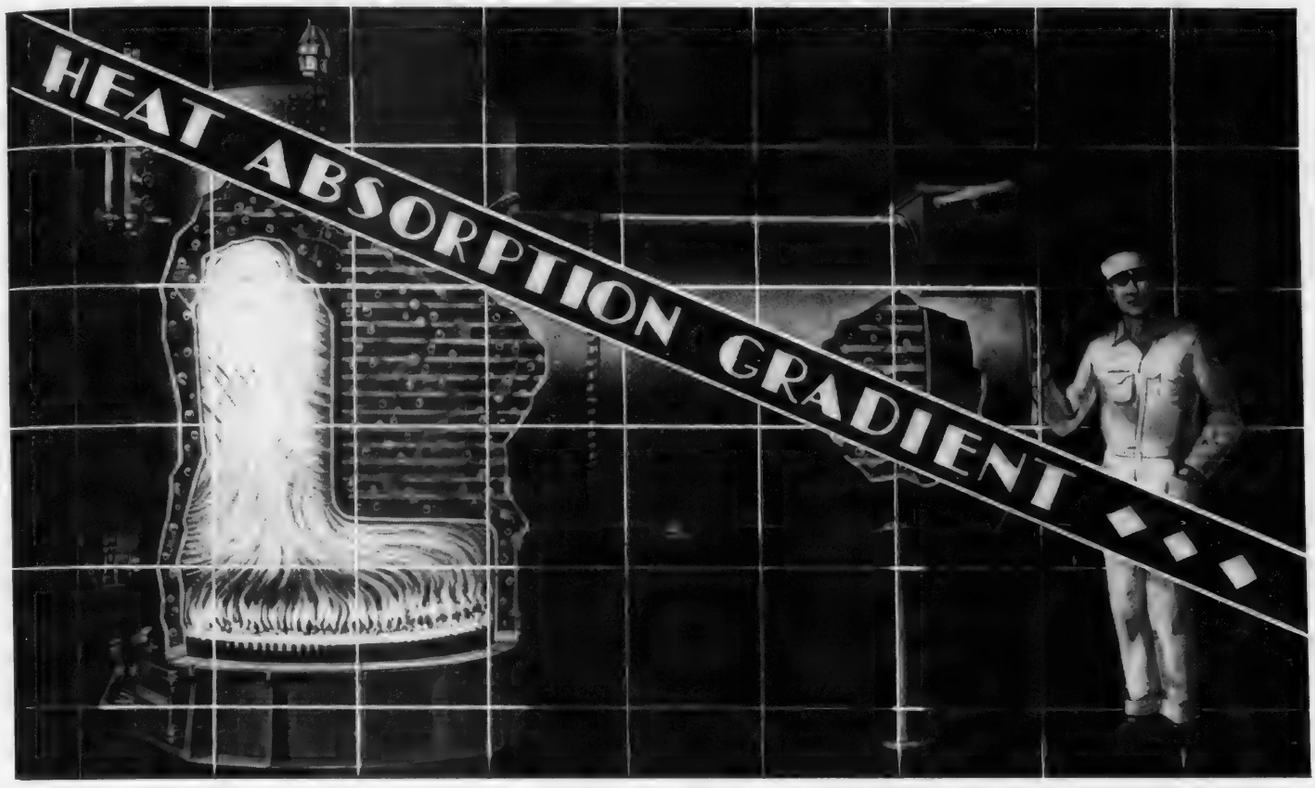
The main riser will run to a pipe space above the fifteenth floor and on to the thirty-second floor. The main in these spaces will feed downward to all floors.

Each of these main distribution systems will have its individual return lines connecting to the Dunham Differential Vacuum Pumps in the basement. The returns from the blast radiation and hot water systems will run to a Dunham Duplex Vacuum Return Line Pump which will return condensation from these to the boiler.

U. S. Patent No. 1644114. Additional patents in the United States, Canada and Foreign Countries now pending.

Over eighty sales offices in the United States and Canada and the United Kingdom bring Dunham Heating Service as close to you as your telephone. Consult your telephone directory for the address of our office in your city. An engineer will counsel with you on any project.

C. A. DUNHAM CO.
DUNHAM BUILDING
450 East Ohio Street, Chicago



HIGH IN HEAT TRANSFER

WALK into the boiler room of any big building where Fitzgibbons steel boilers are giving, day and night, year 'round fuel saving service.

Look in the combustion chamber—an even spread of intense glowing heat. The temperature is at the maximum in that fiery vault. Now walk to the other end of the Fitzgibbons Boiler—lay your hand on the rear flue door—you can rest it there. Open the flue doors. Still no great heat. What more simple and convincing evidence of the high heat transfer of Fitzgibbons Steel Boilers? The heat has been absorbed by the water.

Fitzgibbons Steel Boilers are of distinctive design to secure maximum heat transfer. Of multiple fire tube single flue pass design they are quick steaming. They have repeatedly demonstrated fuel savings of 20% to 40%. Their maintenance cost is nil.

Available in any size from 300 sq. ft. to 36,000 sq. ft. steam rating, they come to the job complete, tight, set-up, ready for service. Minimum installation costs and maximum fuel economy make Fitzgibbons Boilers the first choice of both contractor and owner.

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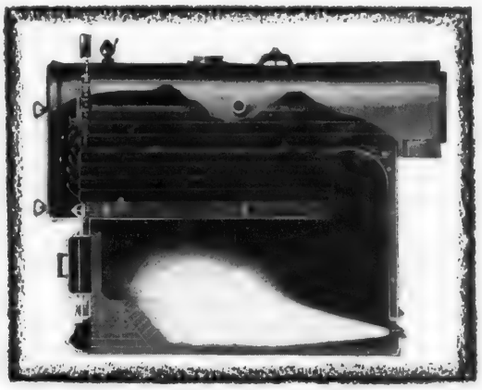


Supreme Tribe of Ben Hur, Crawfordsville, Ind. Building heated by two Heggie-Simplex Boilers, oil fired.

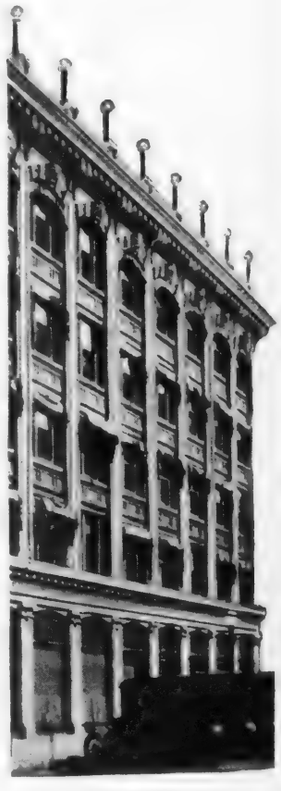
Heggie-Simplex Boilers SAVE $2,600 a Year

"For a number of years we purchased heat for our 5-story building which contains approximately 14,000 square feet of radiation from a public heating plant. This service cost us from $5,400 to $6,000 per year.

"Last year we installed two Heggie-Simplex Boilers, with oil burners. The total cost of operating them during the first heating season was only $3,400. That is, we saved over previous years $2,000 to $2,600.

"In addition we kept the building heated for a longer period of the year than we had formerly done."

(*Signed*) J. C. SNYDER, Supreme Chief
Supreme Tribe of Ben Hur, Crawfordsville, Ind.



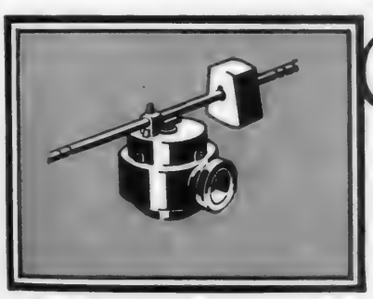
It will pay you also to use Heggie-Simplex Boilers in your buildings—in the new ones to assure, at the start, maximum efficiency and economy—in the old ones to reduce heating costs hundreds, perhaps thousands of dollars annually.

Heggie-Simplex Boiler Co., Joliet, Ill. Representatives in principal cities—telephone and address listed under "Heggie-Simplex Boilers."

HEGGIE-SIMPLEX

STEEL HEATING BOILERS

All the Joys of home depend on~



A Thermostatic Temperature Damper Regulator that is complete in itself and very easy to install. Requires little attention to maintain uniform temperatures.

Your customers will tell their friends about their wonderful heating plant if you install Hot Water Heat Thrush Equipped.

A Good Heating Plant... HOT WATER HEATING THRUSH EQUIPPED

Your Customers want Comfort!

THRUSH SYSTEM makes a closed and automatically regulated job from any ordinary hot water heating plant. It may be adapted to any kind of boiler and can easily be installed on old or new plants. It will positively make any hot water heating job work better, giving increased heat transmission, quicker circulation and a saving in fuel of 20% to 40% annually. It lengthens firing periods and assures mild uniformly maintained temperatures in your customers' homes. It's the kind of product you like to sell—and selling it builds friends for you.

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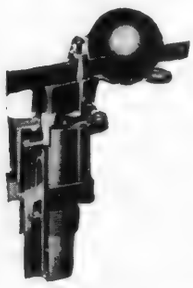
HOT WATER DAMPER REGULATOR

THERE is a Sylphon Damper Regulator, employing the famous Sylphon Bellows as its expansion member, for every steam, hot water or vapor heating system.

Their responsive action to the slightest changes in temperature is constant and dependable, and their great durability makes them outlast the lifetime of the boiler. From the greatest industrial plants to the modest homes, the Sylphon Bellows has carried economy and emancipation from worrisome cares and manual labor.



The Sylphon No. 45-A Damper Regulator

Especially adapted to draft regulation on Hot Water Heating Boilers is shown below here. It controls from 120 deg. F. to 220 deg. F. length of bulb 2 inches threaded 2 inch pipe size. Installed in a Y or screwed into the boiler. For the homekeeper its installation means a very noticeable and much appreciated saving of bothersome labor and fuel costs as well.

The Famous Sylphon Bellows

Like all Sylphon Instruments for the automatic control of temperatures, Sylphon Damper Regulators contain the original and genuine all-metal seamless Sylphon Bellows, a solderless, flexible diaphgram, the most efficient expansion member known to science.

Write for full particulars of the complete line of Sylphon Damper Regulators. Address Department H.

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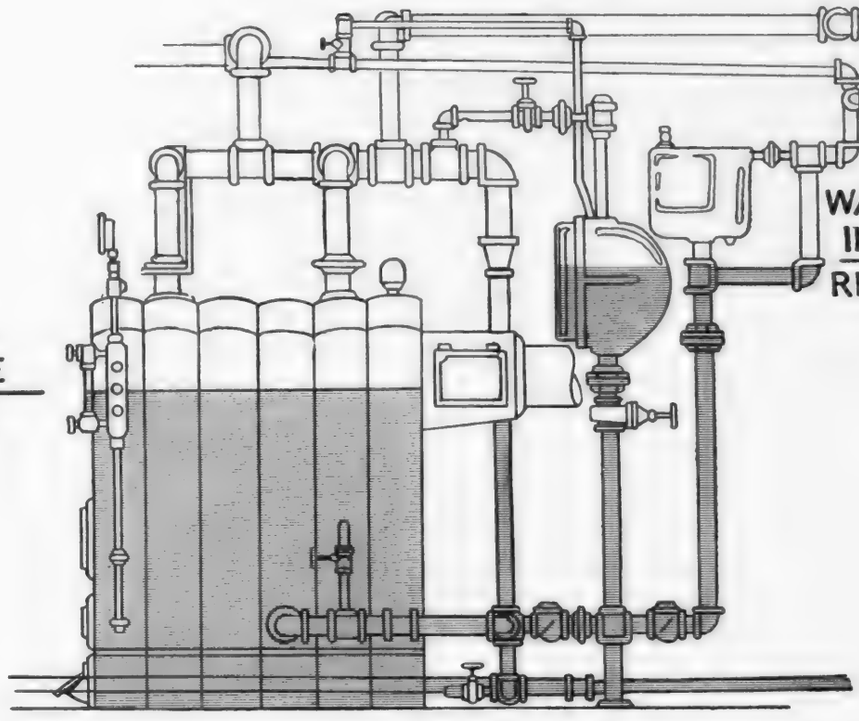

The Webster Type "R" System is SAFE

A BRIEF STUDY of the illustration above will make clear how the Webster Type "R" System has overcome the objectionable and dangerous features of the old style open return line systems.

Follow the water and air down through the return piping toward the boiler to the Webster Vent Trap. This simple, reliable piece of apparatus lets the air out and keeps it out. The air escapes through the Vent Valve which contains a light-weight ball that is lifted from its seat by the slightest pressure. When seated, it prevents the air from returning, thus "sealing" the system so that it may frequently operate for extended periods below atmospheric pressure, further increasing economy. A ball float is provided to prevent the escape of water in case the Vent Trap, for any reason, should fill up.

In the Webster Type "R" System the level of the water in the boiler must be the lowest water level in the system. (Of course, where this is not possible, the Webster Vacuum System should be used.) As long as the pressure in the boiler is low, the difference of water level in the returns and in the boiler is sufficient to overcome the pressure, and water consequently flows to the boiler by gravity.

When conditions arise which create higher pressure in the boiler, the water backs up into the Webster Boiler Return Trap. The float soon trips, admitting steam from the boiler and equalizing the pressure in these two compartments. Again gravity comes into play and the water flows back to the boiler. When the Boiler Return Trap has emptied, the mechanism returns to its first position, closing the valve to the boiler and opening an exhaust valve to the dry return piping.

This equalizes pressure in the returns with that in the Boiler Return Trap and the latter begins to fill again, provided the pressure is still sufficient to prevent flow of condensation directly back to the boiler by gravity.

This safe and sound principle of gravity operation plus positive equalization of pressure is an important reason for the widespread use of Webster Type "R" Systems in buildings of many types requiring 1,000 to 16,000 sq. ft. of radiation.

The coupon below will bring complete data on this system and its equipment—send it today.

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Webster
Systems of Steam Heating

The Webster Steam Heating Specialist in your vicinity can probably help you in developing *preferred* business with Webster Type "R" Systems. Get in touch with him.

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WARREN WEBSTER & COMPANY, Camden, New Jersey.

Please mail Bulletin B-600, describing the Webster Type "R" System of Steam Heating to

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Healthful HEAT!

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C. B. J. Snyder, Arch.
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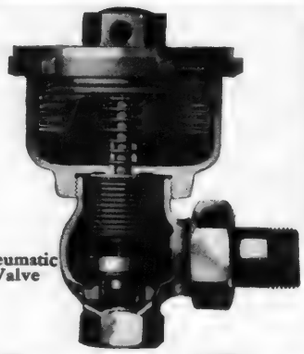

Pneumatic Valve

Rockville Center High School
Architect and Engineer, Huse Templeton Blanchard

At right—Jamaica High School, Queens, N.Y.—Wm. H. Gompert, Arch.—Shevlin Engineering Co. Heating Cont.

From Coast to Coast

BISHOP & BABCOCK Temperature Control Systems are installed in many of the finest buildings. Selection of equipment by exacting tests for efficient performance has resulted in the adoption of B & B Temperature Control Systems for Schools, Churches, Hotels, Office Buildings, Apartments, and other large buildings.

A few Representative B & B Temperature Control Installations:

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Washington Hotel, Shreveport, La.
Western High School, Baltimore, Md.
Baltimore City College, Baltimore, Md.
J. J. Davis & Sons, Detroit, Mich.
West Virginia State Capital Office, Building No. 2, Charleston, W. Va.
Poli's Theatre, Worcester, Mass.
Winthrop School, Melrose, Mass.
School No. 70, Baltimore, Md.
Allen Street School, Lawrence, Mass.
Ludlow High School, Springfield, Mass.
Level Club, New York, N. Y.
York High School, York, Pa.
Society of Jesus Scholasticate, Weston, Mass.
Alrington School, Baltimore, Md.
Windsor Hills Schools, Baltimore, Md.
Jamaica High School, Queens, N. Y.
Buffalo School No. 31, Buffalo, N. Y.
Euclid Ave. School, Schenectady, N.Y.
Roosevelt School, Elyria, Ohio
St. Andrews Church, Cleveland, Ohio
Collinwood Jr. High School, Cleveland, Ohio
Laporte High School, Laporte, Ind.
St. Paul School, Owosso, Mich.
Waukegan Hotel, Waukegan, Ill.
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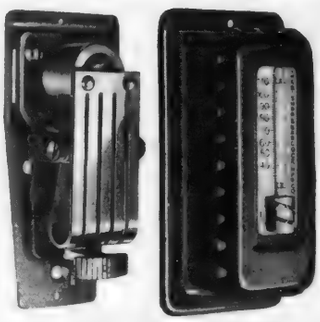
Webster Jr. High School, Oklahoma City, Okla.
Capitol Jr. High School, Oklahoma City, Okla.
Baldwin Filtration Plant, Cleveland, O.
Geo. Washington High School, New York, N. Y.



ALL METAL THERMOSTAT

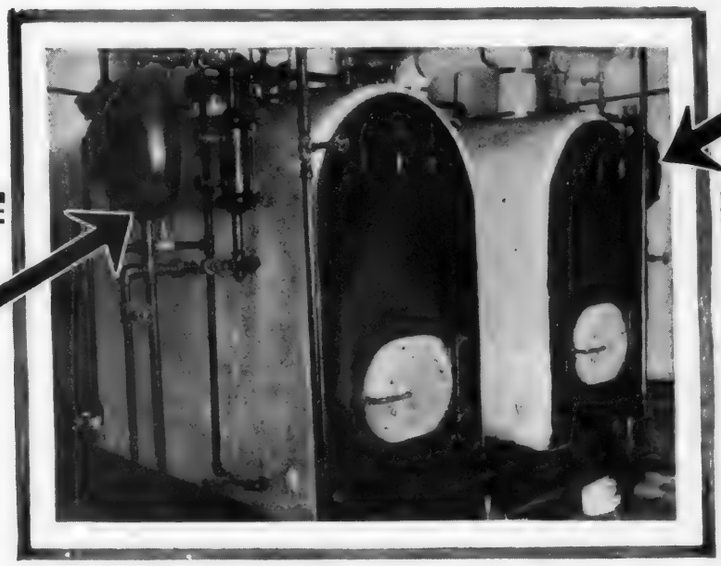
At left—Libby Junior High School, Spokane, Wash.
Vantyne & Hughes, Arch.
I. V. Blair, Heating Contractor

At right—
Webster Junior High School Oklahoma, City, Okla.
Architects and Engineers: Layton, Hicks & Forsyth

The Bishop & Babcock line includes, Vacuum and Vapor Low Pressure Heating Specialties; a complete system of Automatic Temperature Control; Massachusetts Squirrel Cage Fans; Air Washers and Unit Heaters

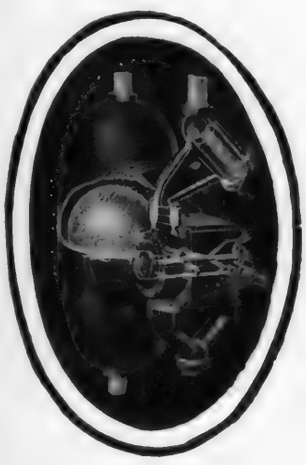
BISHOP & BABCOCK

TEMPERATURE REGULATION
HEATING SPECIALTIES VENTILATING EQUIPMENT



Two McDonnell & Miller Self Cleaning Feeders in the National Education Association Building, Washington, D. C.

Without feeders the job is *not complete*



The "Rolls-Royce" of Feeders—

When you look at the McDonnell & Miller Feeder you see a totally new standard of feeder design and construction. It has only one float—only one moving unit. The feed water does not enter the feed chamber but is fed with full city pressure behind it, exactly as if the feed-valve were manually operated. The fewer parts are made with machine-tool precision. Each feeder is factory tested under actual operating conditions before shipment. It is built for continuous unfailing service—and gives it.

A consulting engineer stated that he did not consider his responsibility completely discharged until he had made sure that every heating boiler under his supervision was equipped with a *good* duplex feeder!

Three years ago he would not have made that statement. But in the meantime the duplex feeder has been writing its own testimonials —has shown, on the job, that it is the best kind of boiler protection— the greatest and cheapest insurance against cracked sections and burned boilers. Today this engineer's opinion merely reflects the trend of all good engineering authority.

Who can deny that in bringing the duplex feeder to the position it now occupies, the McDonnell & Miller feeder has been the moving force? Particularly in the new M & M *Self-Cleaning* Feeder the McDonnell & Miller organization has proved that it is possible to build a duplex feeder which will meet every service condition, every emergency, and every condition of feed water. Rotary self-grinding valves to insure self-cleaning; larger capacity to protect against broken circuits to the condensation pump; adjustable water levels and differentials—these are only a few of the features that have brought a new conception of worth and dependability.

Guaranteed for full year

So flawless has been the record of this feeder that it is now guaranteed for a full year. The graphs and other data in our catalog will interest you. The catalog is as close as the coupon below. Remember that the job is not complete until you install or specify McDonnell & Miller Self-Cleaning Feeders for every boiler.

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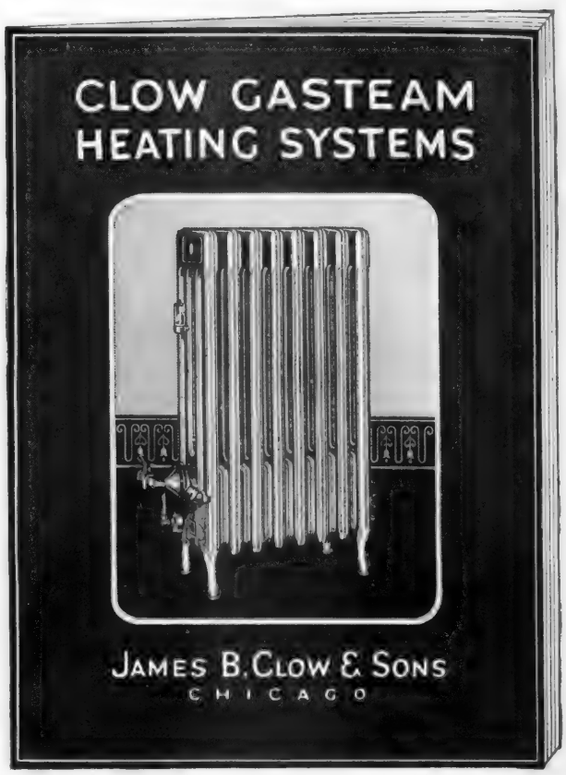
THIS FREE BOOK *Contains* A SIMPLIFIED B. T. U. METHOD *of Calculating Steam Radiation*



Clow heating engineers have just completed a 48 page book that contains clear, concise facts and figures on residential, commercial, and medium-sized public building heating problems.

In it is shown a method of calculating radiation, which retains the accuracy of the B. T. U. method, with the simplicity of the Mills Rule. Actual problems are worked out in the fullest detail with this method.

If you are interested in any way with gas or heating, you should have this free book for your reference library. Fill out and send the coupon today.

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At no cost to me please send me your new heating book.

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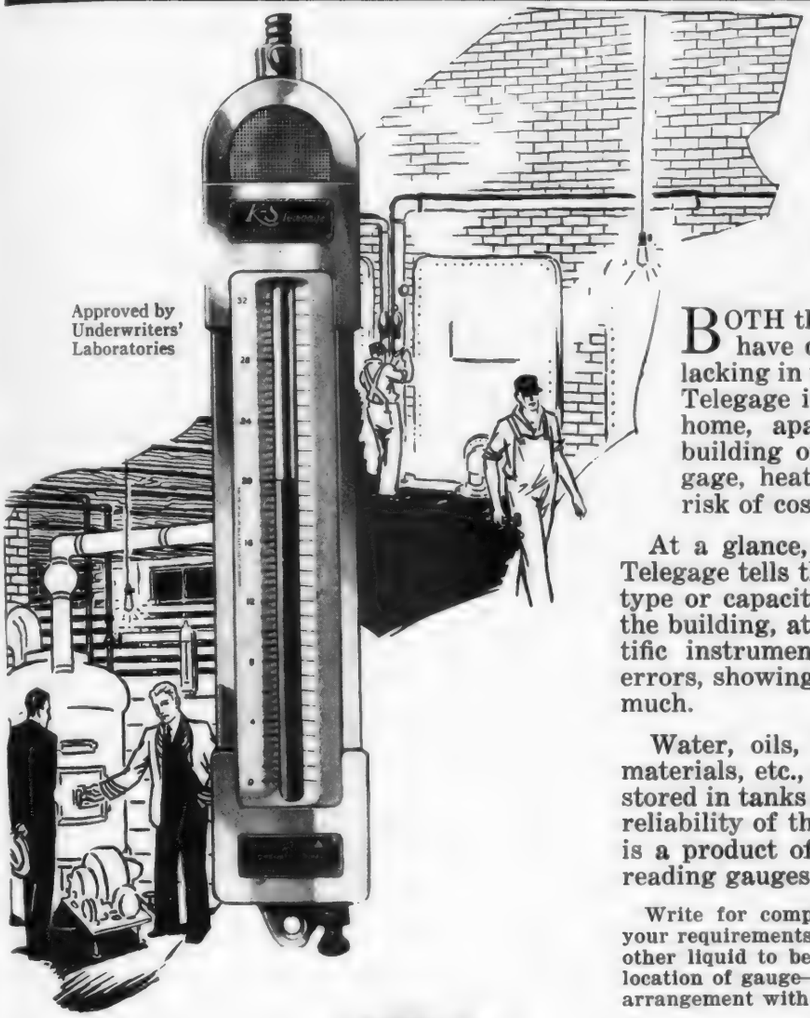

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The Final Touch of Satisfaction

BOTH the heating engineer and building owner have come to realize that there is something lacking in their oil burner equipment until the K-S Telegage is installed—whether it's in the private home, apartment house, hotel, hospital, public building or industrial plant. Without the Telegage, heating engineer and owner alike run the risk of costly fuel failure.

At a glance, with ease and dependability, the K-S Telegage tells the depth of fuel in storage tanks of any type or capacity. Placed conveniently in any part of the building, at any distance from the tank, this scientific instrument guards the fuel oil supply against errors, showing when a new supply is needed, and how much.

Water, oils, chemicals, gasoline, fuel oil, finishing materials, etc., are a few of the many industrial fluids stored in tanks and guarded by the K-S Telegage. The reliability of the Telegage is assured by the fact that it is a product of the world's largest maker of distant-reading gauges.

Write for complete information, giving a full description of your requirements—the Baume or Specific Gravity of each fuel or other liquid to be measured—the distance from tank to desired location of gauge—and size of tank. Information concerning our arrangement with dealers sent on request.

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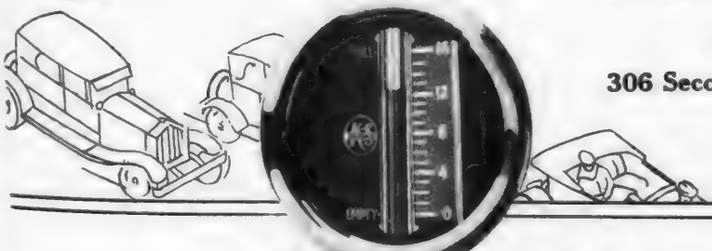


The K-S Telegage

BE CERTAIN WITH THE *K-S TELEGAGE*

Standard factory equipment on three-fourths of all cars selling for $700 or more.

Modine

Cabinet Heaters

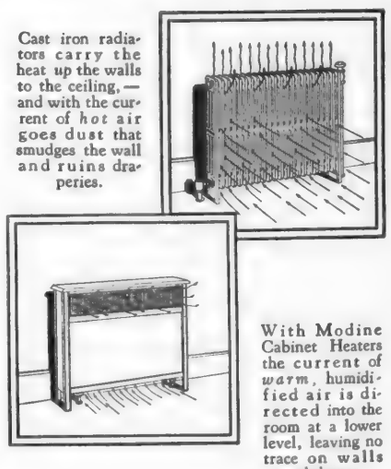
FOR over 5 years Modine Cabinet Heaters have been contributing to the comfort of homes, offices, hospitals and other places where comfort is paramount.

For over 5 years Modine has successfully applied *copper radiation* — which principle is embodied in Modine Cabinet Heaters—to domestic and commercial purposes.

For over 5 years there has been a constantly growing clientele learning from experience the clean warmth and healthful humidity that is possible with this modern form of heating equipment.

For over 5 years Modine Cabinet Heaters have blended unobtrusively into the decoration motif of beautiful homes and offices in good taste.

The guarantee of healthful heat is assured with the specification of Modine Cabinet Heaters.



Cast iron radiators carry the heat up the walls to the ceiling,—and with the current of *hot* air goes dust that smudges the wall and ruins draperies.

With Modine Cabinet Heaters the current of *warm*, humidified air is directed into the room at a lower level, leaving no trace on walls and drapes.

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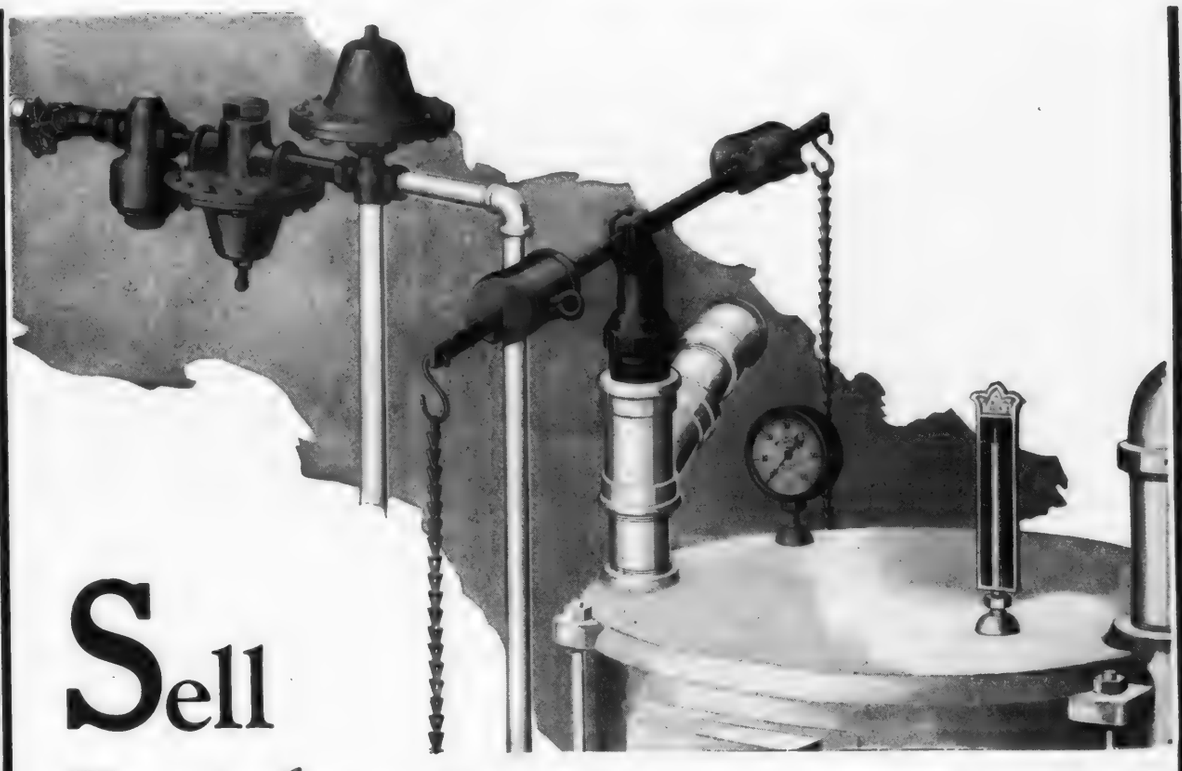
COPPER RADIATION

USED IN PLACE OF CAST IRON RADIATION SINCE 1922

Manufacturers of
MODINE UNIT HEATERS

MODINE MANUFACTURING COMPANY ~ 1707 RACINE ST., RACINE, WIS.



Sell Satisfaction *with larger profits*

Mueller Automatic Heat Control works both ways for the heating contractor—it gives the customer an up-to-date, more economical system at no greater cost to him—and yields a wider margin of profit at a lower cost for installation.

Either new or old plants are prospects—wherever hot water heat is involved the Mueller Automatic Heat Control System is mutually profitable to owner and contractor.

Write now for full information on the Mueller way to satisfied customers and greater profits.

MUELLER CO. (Established 1857) Decatur, Ill.
Branches: New York, Dallas, San Francisco, Los Angeles
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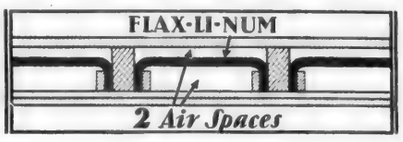
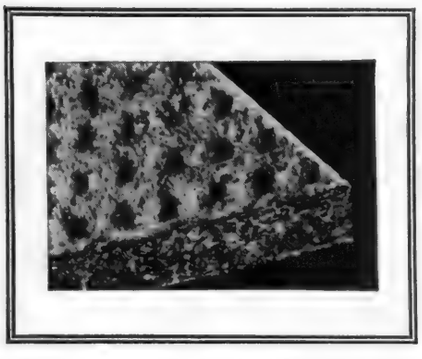
AUTOMATIC HEAT CONTROL SYSTEM

NOT ONLY FLAX-LI-NUM AS AN INSULATING MATERIAL BUT THE SOUNDNESS OF THE ENTIRE FLAX-LI-NUM PRINCIPLE



INSULATION has in the past had but one meaning ... There is a general impression that all insulations are about the same ... yet we know that is not true. The range is all the way from wall boards claiming insulating value ... through insulations claiming wall-board value ... to those pure insulations typified by FLAX-LI-NUM.

Time must inevitably bring forth a classification which is not now present. With the "experience age" will come a new consciousness of values. It has been true of every industry that has been subjected to the pressure of growing. The market into which a product falls is a result, not a cause ... it is dependent upon the character of the product as it exists ... and is as inevitable as the product is unchangeable.



FLAX-LI-NUM'S staunch position in the field of insulating materials is backed by scientific fact. The "two-air-space" method of application is the only method which will give the greatest efficiency of insulation. It is the only method that allows an increase of 50% efficiency after it is installed. These facts are not subject to variation ... They are fundamental natural laws and will search out their markets just as surely as other products have searched out theirs ... or rather have been searched out by them.

FLAX-LI-NUM INSULATING COMPANY ST. PAUL, MINNESOTA

Flax-li-num

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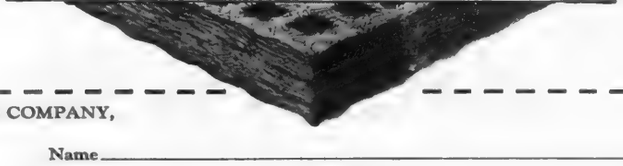

FLAX-LI-NUM INSULATING COMPANY, St. Paul, Minnesota HV4

Send me complete information about Flax-li-num. Also facts about the 2-air-space method.

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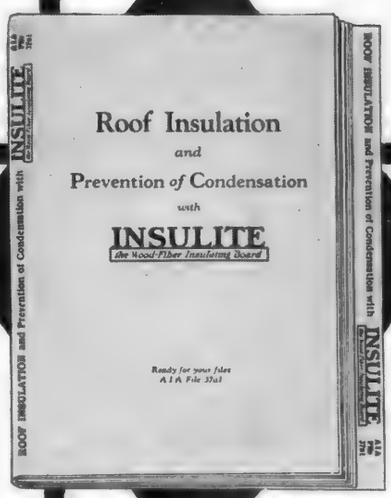

Get the "Fine Points" on~ Heating Jobs

Prepare yourself for your next heating and ventilating installations by referring to this portfolio —"Roof Insulation and Prevention of Condensation with INSULITE." It contains technical "fine points" of detailed charts, prevention of moisture condensation, and constructive information on correct insulation — all being an essential part of any heating job.

INSULITE offers the sure, satisfactory solution. It has unusual strength, great heat-resisting value, is easy to handle and work with. Waste through breakage is eliminated. Moisture and exposure do not injure it.

INSULITE is furnished in one inch and one-half inch thicknesses. Edges are offset on all sides so that all joints are completely heat-sealed after the application is made.

The INSULITE engineering staff, which prepared this portfolio, will be glad to give assistance in connection with special problems, without obligation. Write today for your copy—or more if you need them.

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the Wood-Fiber Insulating Board

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1204 Builders Exchange
Dept. No. 7
MINNEAPOLIS MINNESOTA

THE INSULITE COMPANY
1204 Builders Exchange, Dept. No. 7
Minneapolis, Minnesota

Please send your Insulation Portfolio to—

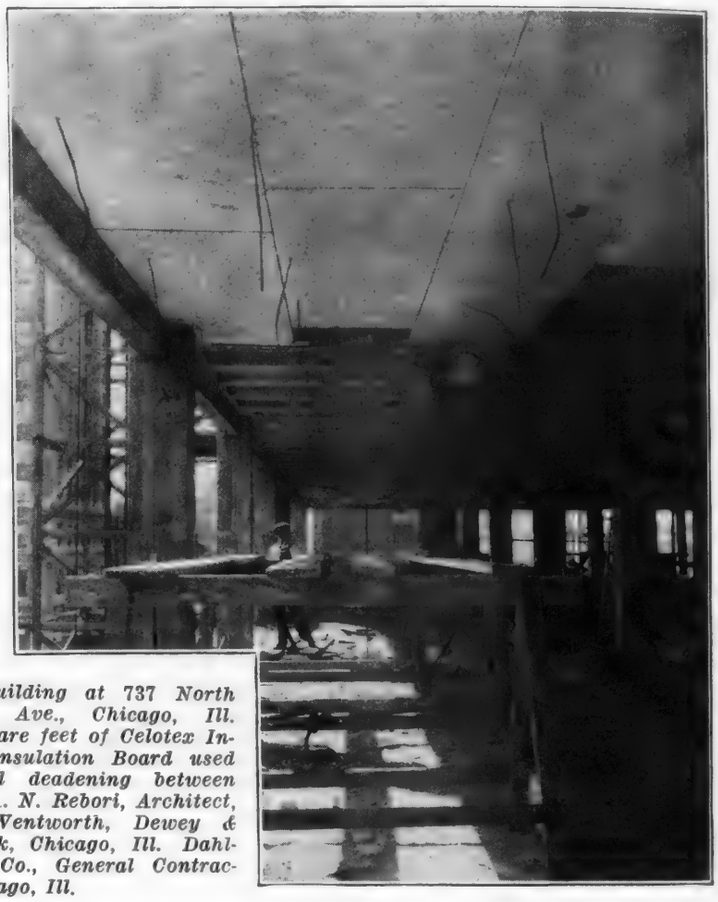
Name.....

Address.....

City..... State.....

Need insulation against sound?

Then you can gain it to high degree by using Celotex Industrial Insulation Board.



Studio Building at 737 North Michigan Ave., Chicago, Ill. 36,000 square feet of Celotex Industrial Insulation Board used for sound deadening between studios. A. N. Rebori, Architect, Rebori, Wentworth, Dewey & McCormick, Chicago, Ill. Dahl-Stedman Co., General Contractors, Chicago, Ill.

HERE is a way to build sound insulation into walls and floors of your buildings at low cost. And obtain heat insulation at the same time. For Celotex Industrial Insulation Board provides both.

Celotex goes into construction wherever a sound insulating product can be placed in the floors and partition walls, without serving as a structural material or a plaster base.

For sound insulating floors, the Celotex generally goes between the sub-floor and the finished floor. In double tile wall construction, its place is between the two wall sections.

Strength and Rigidity

Like other Celotex products, Celotex Industrial Insulation Board is made from the long, tough fibres of cane felted into rigid boards. It has strength, rigidity and resistance to compression (compresses less than 1¼% under a load of 740 lbs. per sq. ft.). It has greater compressive, tensile and torsional strength than non-structural insulating materials. Its strength, toughness and resistance to moisture insure retention of insulating qualities, despite the abuses such materials frequently suffer.

If you desire information about using Celotex Industrial Insulation on any particular job, our engineering staff will gladly consult with you. This service is free and puts you under no obligation. Write for a copy of our Technical Note No. 10A, which describes several efficient types of floors and partitions embodying Celotex Industrial Insulation Board.

Leading Architects and Engineers specify Celotex Industrial Insulation Board for

1. Sound Insulation
2. Air Duct Insulation
3. Weather protection
4. Dry Kiln Insulation
5. Tank and Pipe Line Insulation
6. Drier, Oven, Tentering Machine Insulation
7. Cushioning Motors and Machinery
8. Concrete Form Centering

and a myriad of similar money-saving uses.

THE CELOTEX COMPANY, Chicago, Ill.
Mills: New Orleans, Louisiana
Branch Sales Offices in many principal cities
(See telephone books for addresses)
Sales Distributors throughout the World
In Canada: Alexander Murray & Company, Ltd. Montreal

The word
CELOTEX
(Reg. U. S Pat. Off.)
is the trademark of and indicates manufacture by
The Celotex Company, Chicago, Ill.

CELOTEX
BRAND
INSULATING CANE BOARD
INDUSTRIAL INSULATION

The New PENN THERMOSTAT

Eliminating the use of mercury tubes and relays

NO FRAGILE TUBES

to break or leak; safely installed by any mechanic.

NO RELAYS,

no transformers. Is not affected by vibration or movement. Designed for *across the line* service, handling motors up to 1 H.P. or even larger.

SENSITIVE

and accurate to a degree.

PLEASING

and harmonious in appearance — an ornament to any home.

SUPPLIED COMPLETE

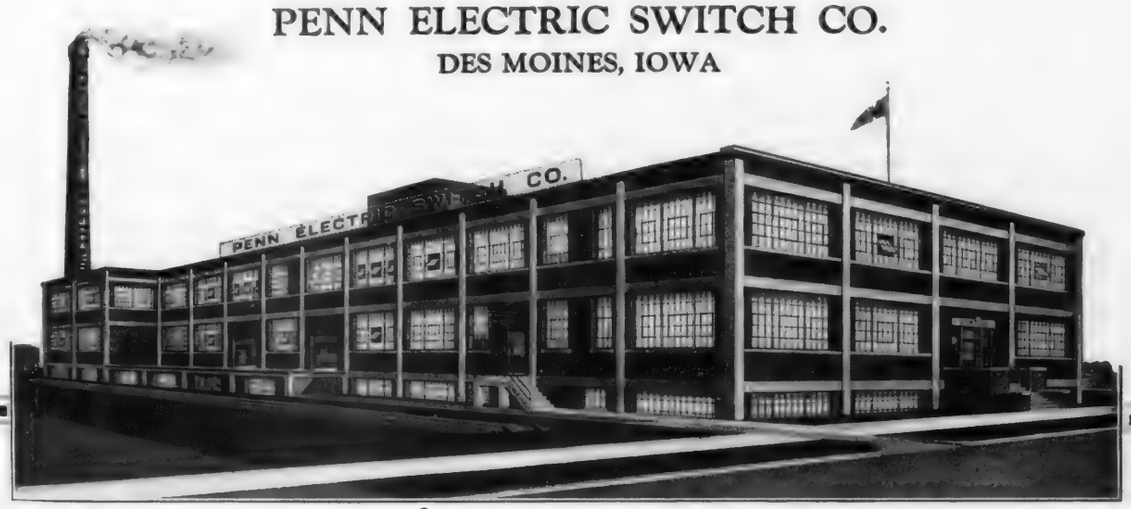
and ready for approved installation.

The New PENN Thermostat is made and sold by a company with a long and successful record in the manufacture of automatic controls; who supply the largest and best concerns in the country with controlling switches of other types; whose plant is equipped with the most modern machinery; and where sound engineering and a disposition to render service are almost a religion.

Complete information on request.

PENN ELECTRIC SWITCH CO.

DES MOINES, IOWA



the best guarantee of

GAS HEATING SATISFACTION

is the nameplate on*

IDEAL GAS BOILERS

backed by the prestige of the greatest name in the heating industry

AMERICAN RADIATOR COMPANY

*

Send for full information to

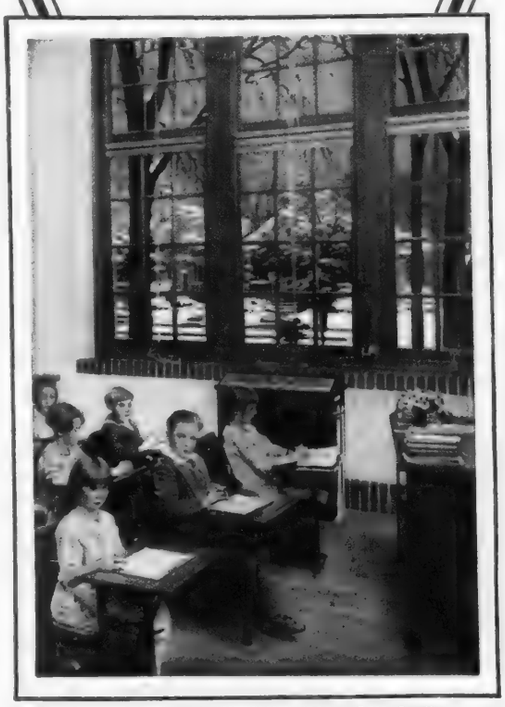
AMERICAN GAS PRODUCTS CORPORATION
376 Lafayette Street
New York

Distributor

The trained mind of the engineer

sees this fact:

Univent results cannot be duplicated by any other ventilating machine



Univent *and* Glass *make the difference*

IN so technical a field as heating and ventilation, only the *trained mind* can readily grasp the differences between various mechanical systems.

Other systems simulate the Univent. To the experienced engineer, the careful investigator, it is a matter of fact, however, that these imitative systems cannot duplicate Univent results. Univent features are exclusive to the Univent.

The Univent is a complete individual ventilation machine built by an organization of specialists in heating and ventilating equipment. It draws air direct from out-of-doors, cleans it, warms it to a comfortable temperature, and silently delivers it throughout the room with agreeable air motion, but without drafts.

Let us tell you of results being accomplished through Univent Ventilation in schools, office buildings, banks, hospitals, and similar buildings. Write for engineer's edition of "Univent Ventilation." The Herman Nelson Corporation, Moline, Illinois.

UNIVENT

(TRADE MARK)

Our Contribution
to the art of Heating & Ventilation

SIX YEARS AGO when the Herman Nelson light weight, compact, indestructible radiator was placed on the market, it was immediately accepted as the greatest advance in the art of Heating and Ventilation in a generation. It has made possible heating and ventilation dependability and performance hitherto unattainable.

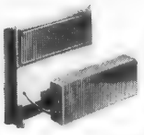
The Herman Nelson Wedge Core Radiator is an exclusive feature of all Herman Nelson Heating and Ventilating Products and accounts for their unequaled performance.

HEATING · VENTILATING · COOLING · DRYING · CONDENSING

UNIVENT

for the ventilation of schools, hospitals, offices and other buildings presenting an acute ventilating problem.

HERMAN NELSON
Invisible
RADIATOR

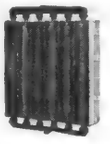


. . . supersedes all previous radiators, radiator cabinets or enclosures. Occupies no room space and makes possible any desired decorative scheme or furniture arrangement. Indestructible in service.

THE HERMAN NELSON
hiJet
HEATER

It operates at steam pressures from 1 to 150 lbs., and offers the better and more economical way of diffusing heat in Factories, Railroad Shops, Roundhouses, Mills, Warehouses, Garages, Gymnasiums and Industrial Buildings.

Herman Nelson Radiator Sections
for Blast Heating and Cooling



Indestructible, operating at any steam pressure from 1 to 150 lbs., non-corrosive and leak-proof.

May be arranged in banks to solve any special problem of heating or cooling.

THE HERMAN NELSON CORPORATION · ***Moline, Illinois***

Builders of Successful Heating and Ventilating Equipment for over 20 Years

Sales and Service

BELFAST, ME.	UTICA	SCRANTON	SAGINAW	CINCINNATI	DES MOINES	ST. LOUIS	DALLAS	DENVER	SEATTLE
BOSTON	BUFFALO	PITTSBURGH	DETROIT	TOLEDO	MILWAUKEE	BIRMINGHAM	OMAHA	SALT LAKE CITY	SAN FRANCISCO
PROVIDENCE	PHILADELPHIA	CHARLOTTE, N. C.	CLEVELAND	INDIANAPOLIS	GREEN BAY	ATLANTA	EMPORIA	SPOKANE	VANCOUVER
NEW YORK CITY	WASHINGTON, D. C.	GRAND RAPIDS	COLUMBUS	CHICAGO	MINNEAPOLIS	MEMPHIS	KANSAS CITY	PORTLAND	TORONTO
									WINNIPEG, MAN.

150 Pounds Pressure CRANE VALVES 2500 Pounds Pressure

Radiator valve 113

Radiator valve 112

This new line of low type radiator valves, Nos. 112, and 113, will perform all the duties of steam radiator service in an unusually accurate and satisfactory way.

A new radiator valve

Crane Co. now offers to contractors a better channel of profit and an easier fitting to install... to the public, better and more efficient service...in this new line of radiator valves.

The points of design which substantiate this statement are:

Easier to install and repair—the bonnet has unusually convenient wrench flats. The renewable disc is held firmly against the forged brass slip on disc holder by means of a brass washer and nut.

Unusual strength and reliability—counterpieces, disc holders, tailpieces, tailpiece rings, and packing nuts are of forged brass.

Long service—packing rings in stuffing box are of braided asbestos.

Ease in operation—a molded composition handwheel connected to the top of the rolled brass stem responds instantly to force applied on it, and eliminates the danger of burned fingers.

Attractive—low and compact in type, this line of valves is unusually pleasing to the eye.

With their inheritance of the 74 years Crane prestige, their mechanical perfection and their appearance, this new line of radiator valves cannot help but conquer...create sales for piping contractors and make new friends for them.

CRANE

GENERAL OFFICES: CRANE BUILDING, 836 S. MICHIGAN AVENUE, CHICAGO
NEW YORK OFFICE: 23 W. 44TH STREET
Branches and Sales Offices in One Hundred and Eighty Cities

Jenkins VALVES ARE ALWAYS MARKED WITH THE "DIAMOND"

TRADE JENKINS MARK

Jenkins Bros.

Left: Fig. 370, Jenkins Standard Bronze Gate Valve, screwed. Ewing Galloway

Helps keep your men on new jobs

A Jenkins Valve, once installed, takes good care of itself. Once installed, it *stays* installed; the heating contractor avoids the handicap of having to take men off new jobs to make repairs and replacements on old ones.

Each Jenkins has the built-in strength to withstand pipe strains—lifting or settling, expansion or contraction. Many factors are responsible for this strength — analyses - proved metals—careful design and frequent inspection in manufacture —accuracy and precision in machining and assembly—thorough testing.

In the Jenkins line your men can find a valve for practically every purpose. For a comprehensive survey of the principal types, send for form 100.

JENKINS BROS.

80 White Street, New York, N. Y. 133 North Seventh Street, Philadelphia, Pa.
524 Atlantic Avenue, Boston, Mass. 646 Washington Boulevard, Chicago, Ill.
JENKINS BROS., Limited, Montreal, Canada; London, England
Factories: Bridgeport, Conn.; Elizabeth, N. J.; Montreal, Canada

Jenkins
VALVES
Since 1864

THE CHICAGO DAILY NEWS, CHICAGO, ILL.

Holabird & Root
Architects

J. A. Sutherland
Engineer

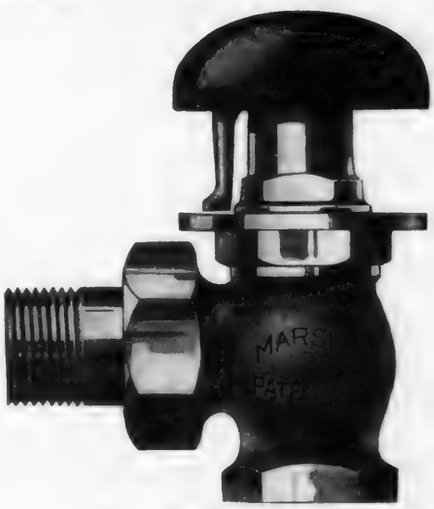
Hegeman-Harris Co.
General Contractor

Robert Gordon, Inc.
Heating Contractor

MARSH CONE DISC MODULATED VALVES

Fig. 147

used throughout on this job



Cone Disc Modulated
Fig. 147

MARSH VALVE COMPANY

DUNKIRK **NEW YORK**

General Sale Distributors

Edward T. Hetherington
1709 Sansom St., Philadelphia

Appleton & Liptrott, Inc.
1480 Broadway, New York

John W. Mabbs
431 So. Dearborn St., Chicago, Ill.

United States Radiator Corp'n
General Offices: Detroit, Mich.

SARCO COMPANY, Inc.
183 Madison Ave., New York

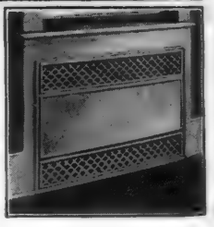
Taylor-Forbes Company
Canadian Agents Guelph, Ont.

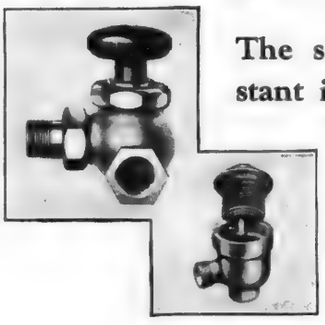
THIS PROVES TRANE'S ABILITY TO KEEP AHEAD OF THE EXPANDING MARKET

Under-Window Concealed Heater paves the way for universal use of convection heating

The timely appearance of the Trane Under-Window Concealed Heater is evidence that the Trane organization means to be, not merely the pioneer, but also the unquestioned leader in the movement toward more modern room heating.

This latest model reflects the experience of the trade with earlier models. It solves every one of the major problems raised in connection with the early success of the system. It provides a complete assembly with nothing extra to buy. And the working parts are fully accessible at the turn of a few screws, through the removable front panel. With the ingenious underslung pipe connection, a foot of wall space is saved.





The same policy of constant improvement insures Trane's firm grip on leadership of the Heating Specialties field. The balanced pressure feature of the Trane Thermostatic Bellows continues to stand out as a notable accomplishment. And the signal feature — silently but unfailingly guiding the heating man to any defective trap—is a point that appeals to you if you intend to stand by your jobs through their years of service. Write for complete information on the latest improvements by Trane, before you buy or recommend any part of a heating system except the boiler and piping.

THE TRANE CO., *Dept. 5*
206 Cameron Avenue La Crosse, Wis.

HEAT CABINETS **TRANE** CONCEALED HEATERS
PUMPS, UNIT HEATERS, AND HEATING SPECIALTIES

Kennedy

A single source *for* ALL your valves

Standard Bronze Globe Valve

Radiator Valve

Bronze Check Valve

Kennedy Standard Bronze Gate Valve

Iron Body Gate Valve

WHETHER you need valves for water service lines, radiators, fire protection systems or steam control—any pressure, material or finish—there is a suitable Kennedy type and size.

Standardizing on Kennedy gives you a single — and *dependable* — source of supply for all your valve requirements—dependable in design, workmanship and service.

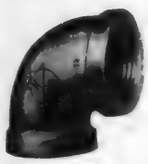
Specify Kennedys for your next job. Note their attractive appearance, clean-cut machine work, finish, and threading, and freedom from flaws of any kind. You will quickly see why so many engineers and architects have standardized on Kennedys for a quarter of a century and more, and keep on using them to assure profitable, trouble-free piping jobs.

The Kennedy Valve Mfg. Co., Elmira, N. Y.

WAREHOUSES: New York, 128-132 White Street; Chicago, 1335-1337 S. Clinton Street; San Francisco, 448-450 Tenth Street.

SALES OFFICES: New York, Philadelphia, Cleveland, Chicago, Atlanta, Salt Lake City, El Paso, Los Angeles, San Francisco, Seattle.

KENNEDY Fittings, too



Complete lines of black and galvanized malleable iron screwed fittings, brass or bronzed screwed fittings and standard cast iron flanged fittings and flanges are also included among the large list of Kennedy Products — an additional advantage of standardizing on Kennedy.

The Comment Corner

"Your fittings and valves are perfectly satisfactory. I highly recommend them to other users," writes a long-time user of Kennedy products — one of hundreds who have written us after standardizing on Kennedy.

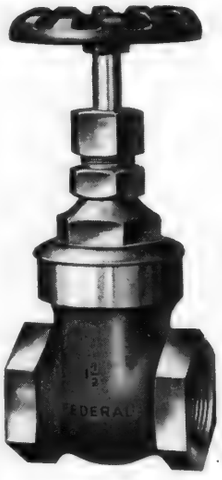
Facts about Kennedy No. 1

Kennedy installation No. 1—now over 50 years old—is still in daily service and giving complete satisfaction to the engineer in charge.

KENNEDY

VALVES-PIPE FITTINGS-FIRE HYDRANTS

WALWORTH BRASS VALVES

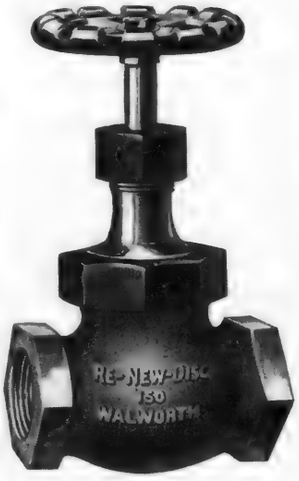


FEDERAL

125 lbs. W. S. P.

Features of the New Federal Gate Valve:

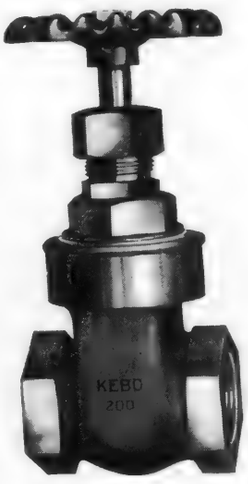
Stronger hexes, heavier body, more room in ports, increased body flange width, improved appearance.



RE-NEW-DISC

150 lbs. W. S. P.

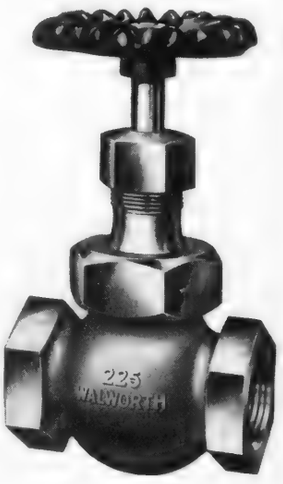
Malleable iron stuffing — box nut and bonnet ring give this popular valve remarkable strength.



KEBO

200 lbs. W. S. P.

Rugged construction, ample strength. This valve has amazing powers of resistance under severe service conditions.



REGRINDING

225 lbs. W. S. P.

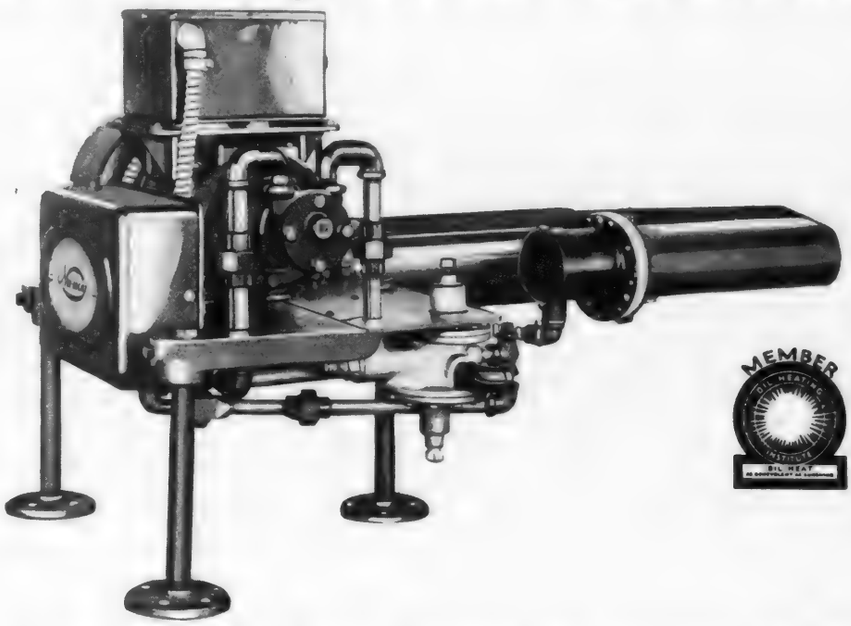
With short, heavy body, ample threadway. A light valve that resists distortion in making up and on sagging pipe lines.

THERE is a high grade Walworth brass valve for every pressure rating from the standard valve of all work, "The Federal" for 125 lbs., to the Walworth extra heavy Hard Bronze valves for 350 lbs. saturated steam. For most of the great number of plumbing, industrial and power uses between 125 and 225 lbs., the Walworth "Federal", "Re-New-Disc", "Kebo" and "Regrinding" (shown here) are especially recommended. Like all Walworth brass valves every one of these is individually tested before we ship it. Have you ever got your copy of the Walworth Brass Valve Book?

WALWORTH

Walworth Company, General Sales Offices: 51 East 42nd St., New York
Plants at Boston, Mass.; Kewanee, Ill.; Greensburg, Pa.; and Attalla, Ala.
Distributors in Principal Cities of the World
Walworth International Co., 11 Broadway, New York, Foreign Representative
Walworth Company, Limited, 620 Cathcart St., Montreal, P. Q.

The Market for Oil Burners Has Hardly Been Scratched



THE 1929 Survey of the Oil Burner Industry just completed by *Fuel Oil* shows beyond all question of doubt that the real opportunity for selling oil burners is still ahead.

Here are some of their figures:

Estimated number of burners now installed, 520,516
Estimated market for domestic and commercial burners, 2,951,705
Only 3% of the wired homes equipped with oil heat
Average sales increase for 1928 was 36%

If you want to collect a share of the profits of this rapidly growing industry, you can do it by selling

AUTOMATIC OIL BURNER
Nu-way
FOR HOME HEATING

Automatic Oil Burners

The Nu-Way Corporation is one of the pioneers of the industry and makes a complete line of burners adaptable for any heating job from the small bungalow to the largest residences, churches, apartment or office buildings. Now is the time to select your line of burners for 1929.

See Us at the Convention, New York City, April 9, 10, 11, or write direct to

The Nu-Way Corporation, Rock Island, Illinois

37 ~~46~~ Wanted! partners

Only 37 Men Can Now Enjoy Our Offer to Make them Partners

WE published an advertisement in this magazine offering to 46 men an opportunity to become partners in our business. Of the hundreds that responded, nine have been chosen as the type of men that we want associated with us. They have been established in a lucrative business as Quiet May Dealers, and have entered into our profit-sharing plan as partners in our business. This same opportunity is now open to 37 more men—not misfits or failures—but wide awake business men who can and will be successful.

The Quiet May Dealers' Investment and Profit-Sharing Trust

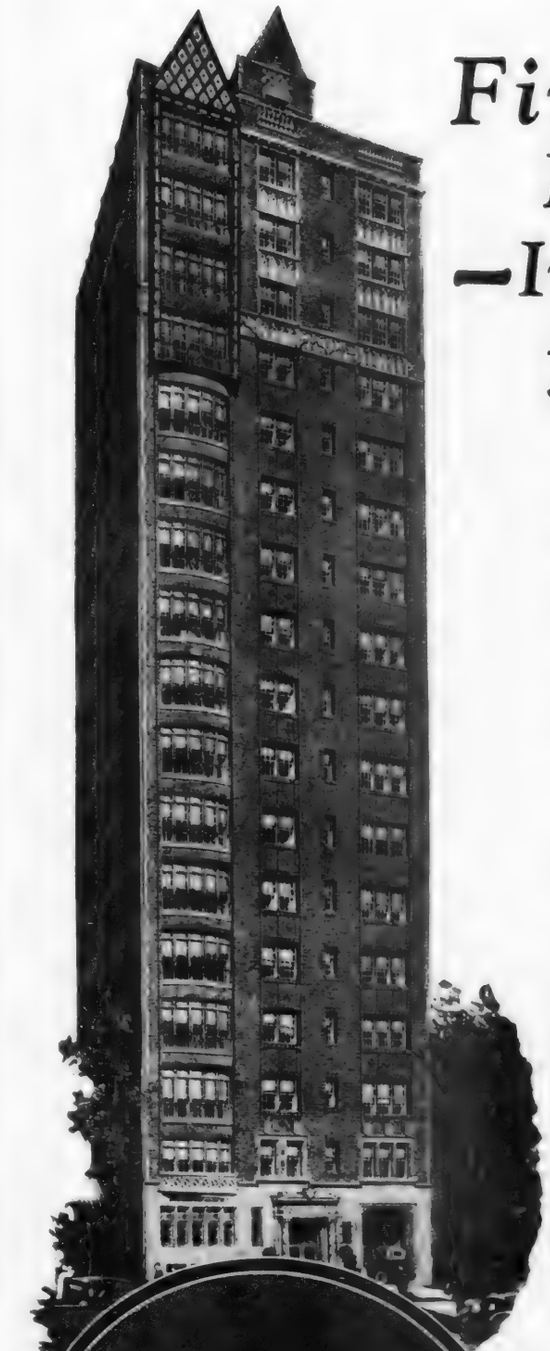
For the first time in the history of the business a manufacturer is taking his dealers into partnership on a profit-sharing plan. No dealer is called upon to risk any of his money and those who participate in this Investment and Profit-Sharing Trust will automatically place themselves in line for a share of the *factory profits*.

Inquiries invited from interested people regardless of their present business affiliations.

MAY OIL BURNER CORPORATION

BALTIMORE, MARYLAND

OFFICES: NEW YORK 331 Madison Avenue — CHICAGO 35 East Wacker Drive — BOSTON 89 Federal Street



Fine Enough for Luxurious Apartments —Inexpensive Enough for Modest Homes

Among the newer, fine buildings for which McQuay Cabinet Radiators have been selected, is this luxurious "Co-Op," designed by Reichert & Finck for 5421 Cornell Ave., Chicago. Yet you will find McQuay Cabinet Radiators equally as popular for heating modest homes.

Owners of buildings have discovered that their unobtrusive beauty immediately appeals to buyers and tenants *actually helping to sell or rent apartments and houses.*

Yet their cost is seldom more, and often less, than for ordinary radiators with their necessary separate covers or shields.

Because they send the heated air out into rooms in a horizontal direction, they provide the circulation so necessary to quick, effective heating.

This helps to reduce heating costs.

A humidifying pan (inside the cabinet) gives the heated air the moisture needed for health and comfort.

On your next job—figure McQuay

McQUAY RADIATOR CORPORATION

General Sales Office: Pure Oil Building, Chicago

New York: 2148 Graybar Bldg. Boston: 10 High St. Cleveland: 291 E. 149th St
Newark, N. J.: J. F. McLaughlin Co., 738 Broad St.
Pittsburgh: Bushnell Mach. Co., Century Bldg.

A Complete Radiator Not just a cover

McQUAY *Cabinet* RADIATOR

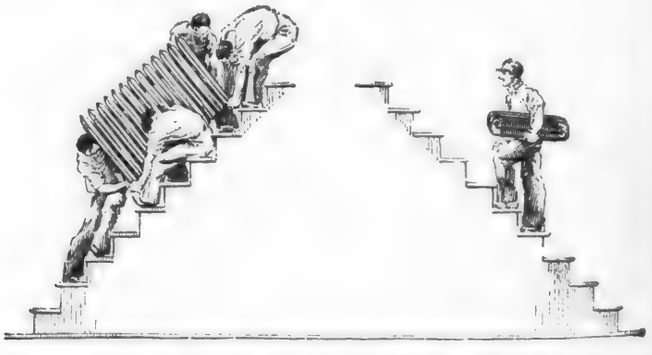
Here a ROBRAS 20-20 Radiator of thirty-four and a half square feet is enclosed in the partition wall.

Must ROBRAS 20-20 RADIATORS Always Be Under A Window?

IT is not necessary that ROBRAS 20-20 Radiators always be installed beneath a window. Where, for any reason, it is difficult to make a suitable recess in the outside wall, ROBRAS 20-20 Radiators can be installed in the wall between rooms. The depth of the recess required is 2¼ inches for a radiator one-section deep and only 3¾ inches for a radiator two-sections deep. Thus, in a space 50 inches long, between standard studding of interior walls, a ROBRAS 20-20 Radiator two-tiers high and two-sections deep gives off heat equal to a cast iron radiator of 61 square feet.

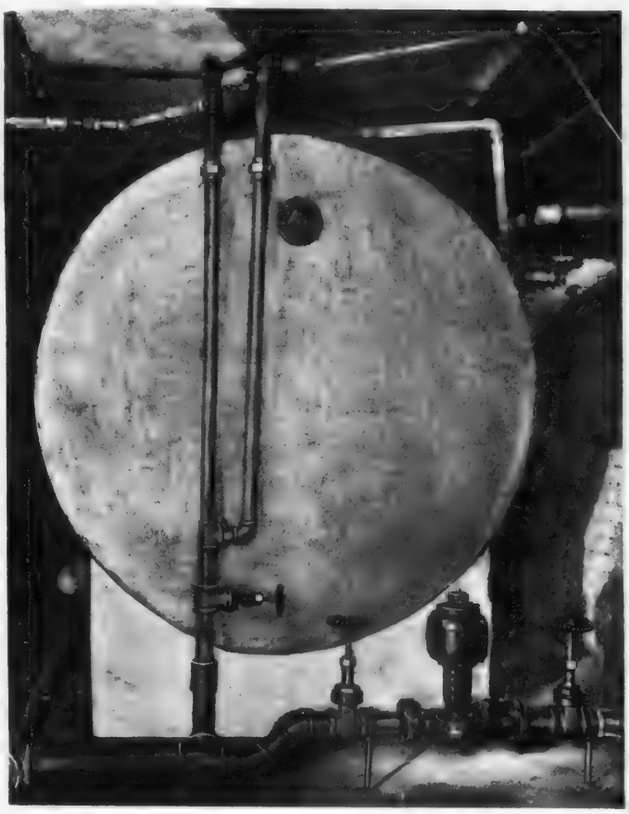
ROBRAS 20-20 Radiators weigh 80% less than cast iron radiators of equal rating. That means a great saving in installation and handling costs.

We will be glad to send you the information about the profit made by installing these radiators. Please send us your name today.



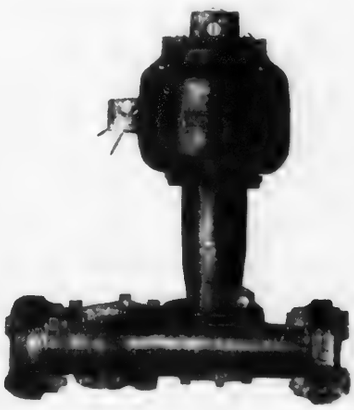
ROME BRASS RADIATOR
CORPORATION
ONE EAST FORTY-SECOND STREET :·: :·: NEW YORK CITY

A HYDROLATOR installed on a large domestic service water job.



The HYDROLATOR

Banishes Hot Water Circulation Troubles

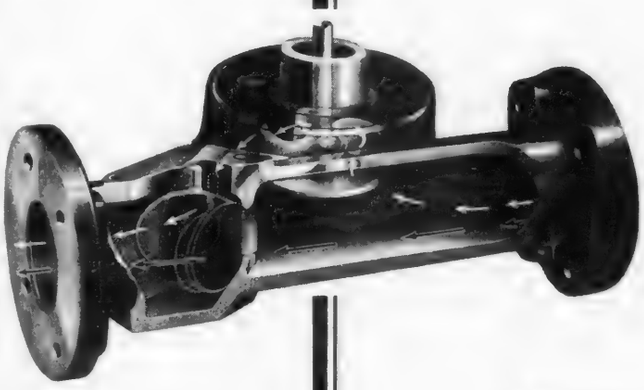


The efficiency and circulation of any hot water system can be improved by a HYDROLATOR, and especially is this true of "sick" jobs. The effect of a HYDROLATOR on such systems is astonishing — it instantly banishes sluggish circulation and forces heat to all radiators. It practically equalizes the water temperature throughout the system.

Uses

1. **BANISHES SLUGGISHNESS.** Gets hot water to radiators a few moments after turned on.
2. **CIRCULATES WATER BELOW BOILER LEVEL.** Indispensable in buildings with basement radiators.
3. **CIRCULATES WATER ON LONG PIPE RUNS.** Without a HYDROLATOR such systems, usually in greenhouses, are invariably sluggish.
4. **OVERCOMES TRAPS.** Forces water through traps which completely stop ordinary thermal circulation.
5. **FOR DOMESTIC SERVICE WATER SYSTEMS.** Stimulates circulation—assures constant supply of hot water.

There is only one HYDROLATOR



Interior view. White arrows indicate path of water with HYDROLATOR turned on. Black arrows indicate path of water with HYDROLATOR turned off.

Interesting details on the HYDROLATOR will be gladly mailed to you on request. Write for Bulletin 828-H.

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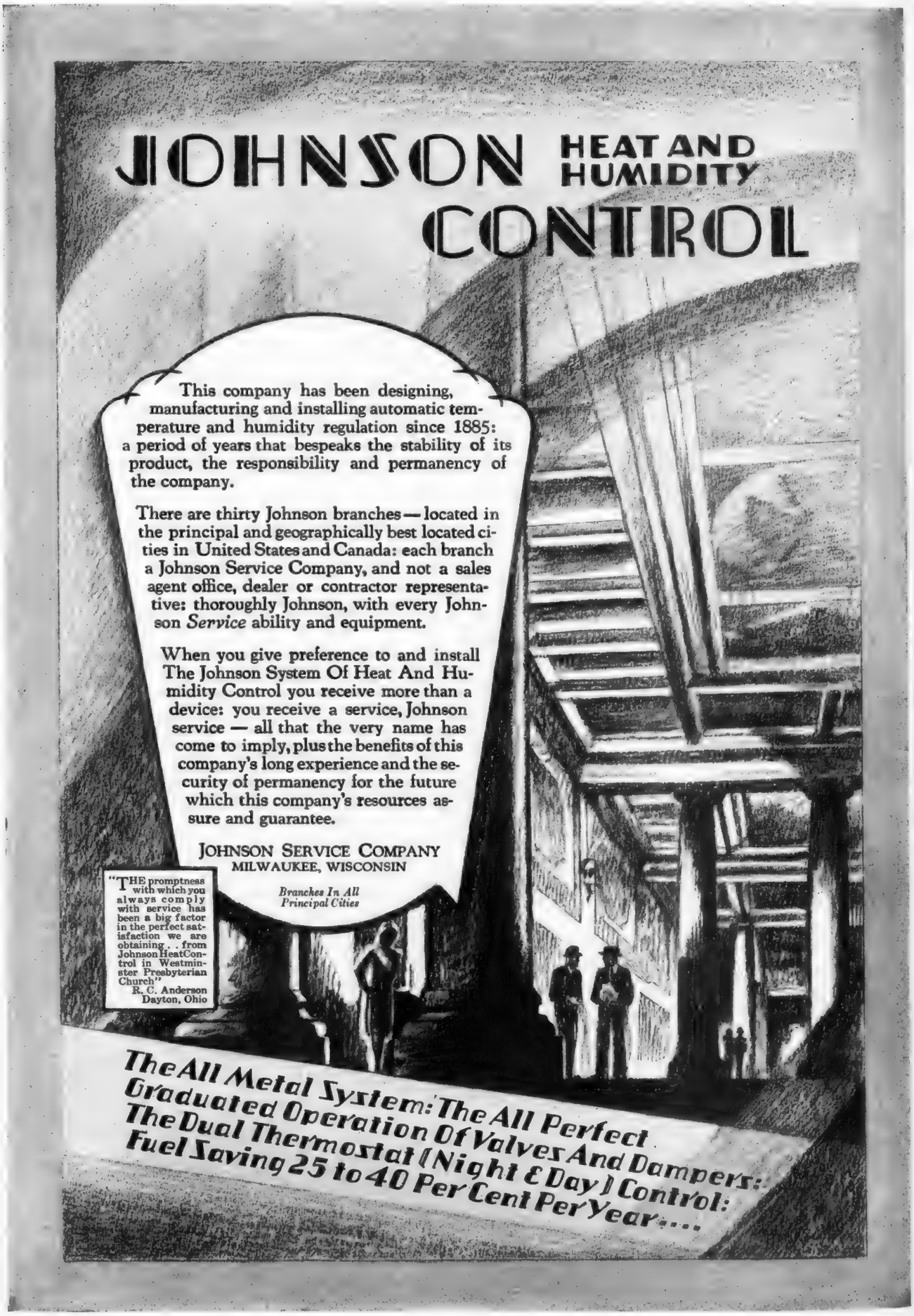
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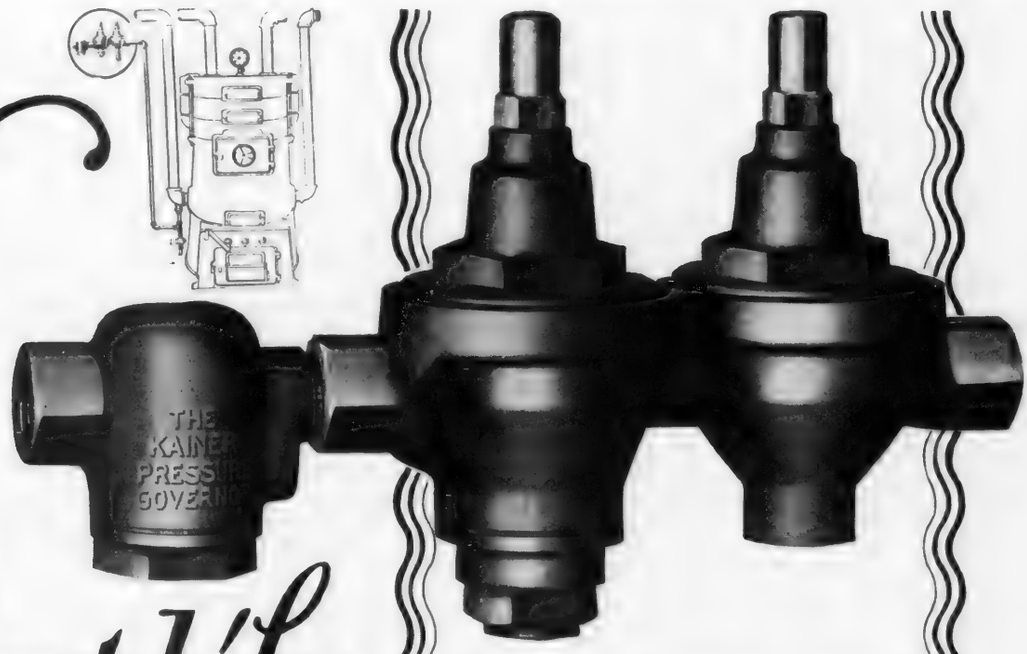

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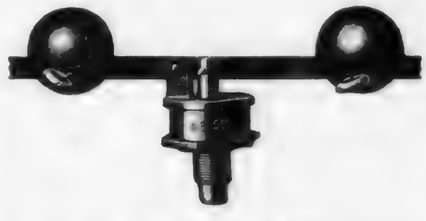

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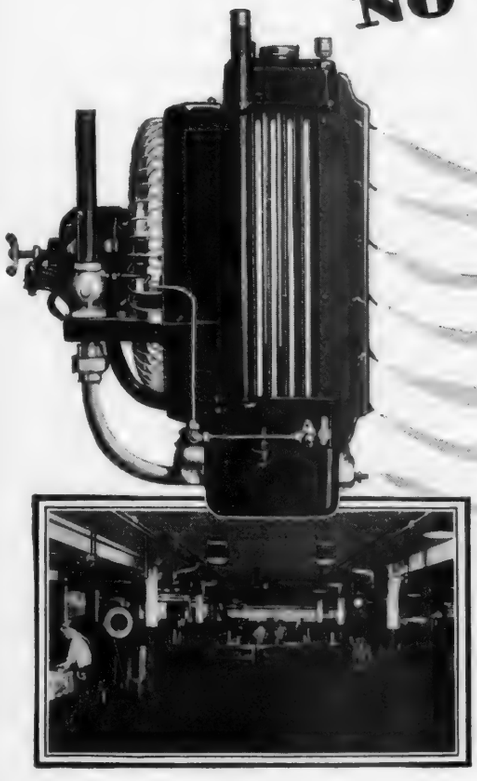

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It burns Gas
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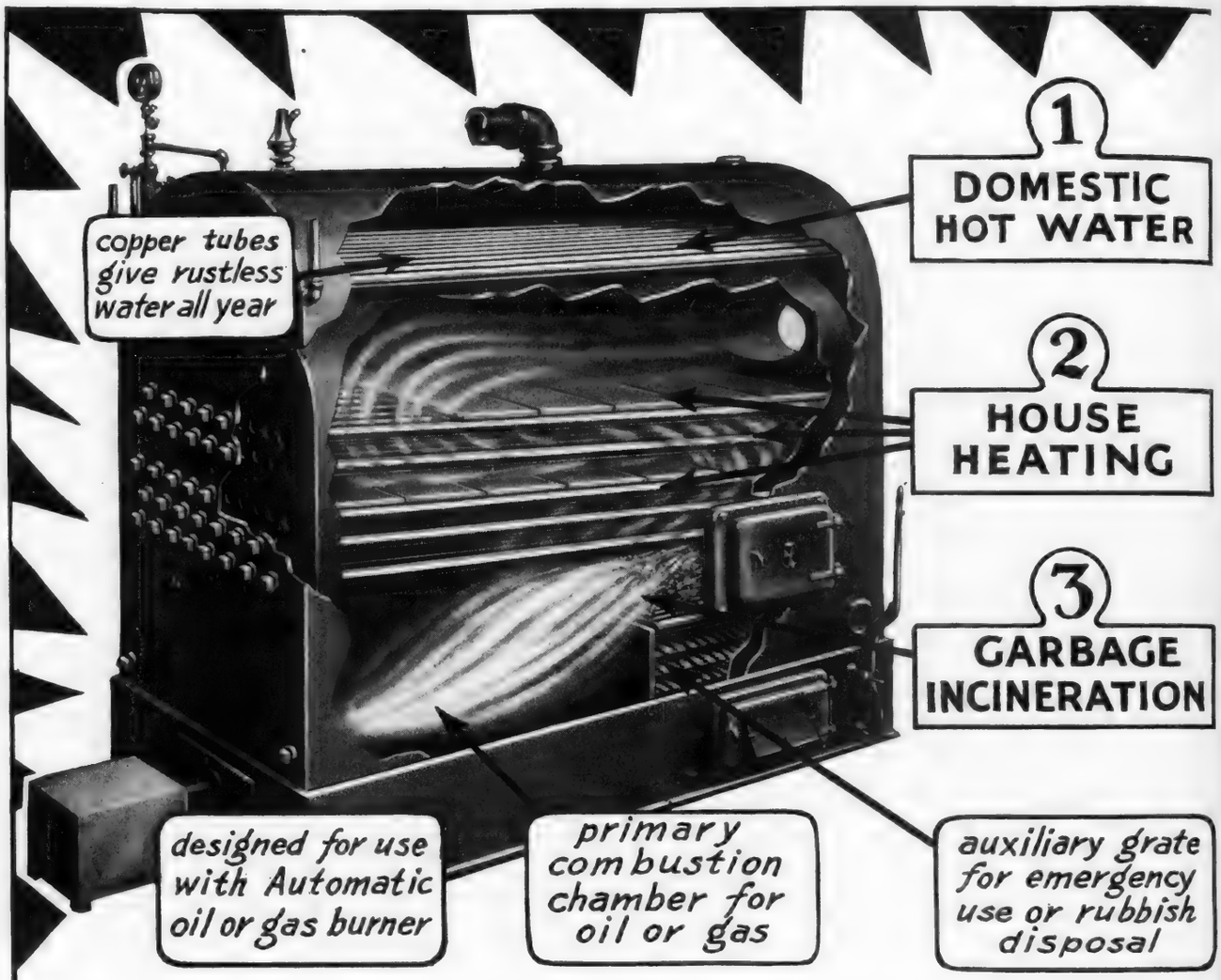
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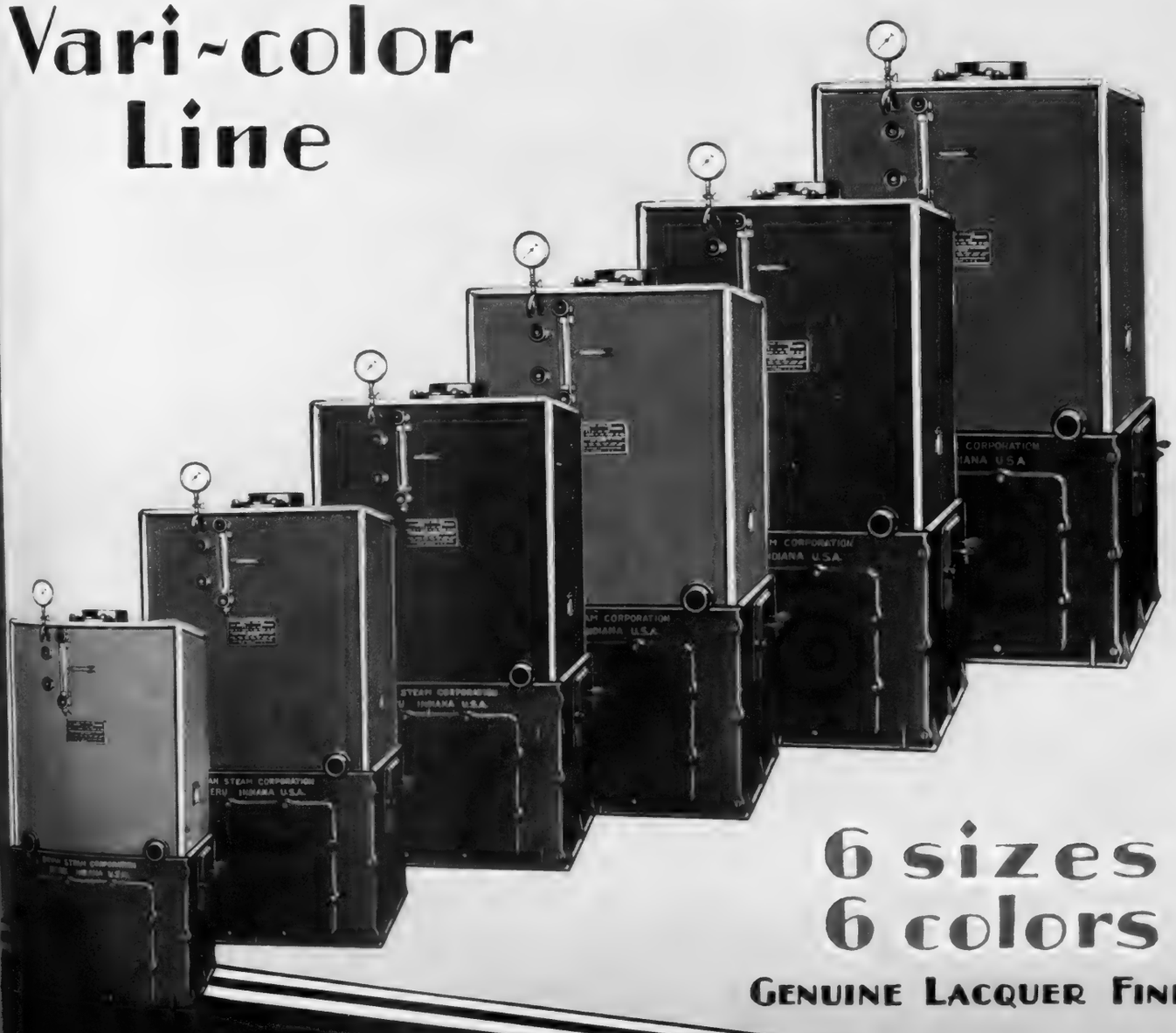

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Peru, Indiana, U. S. A.

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for Use with
Oil Burner

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Philadelphia's newest and most modern store for women's apparel.

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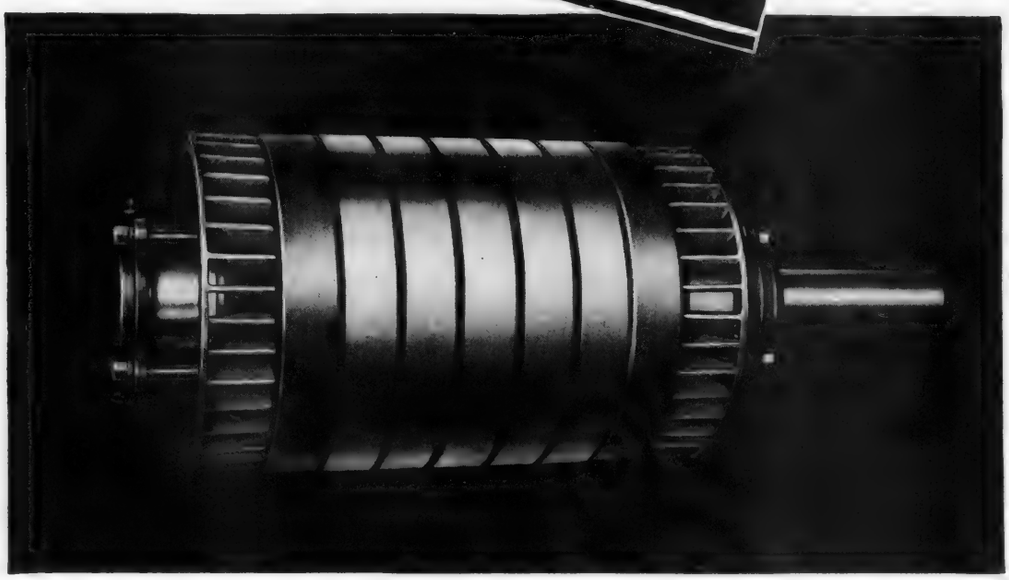

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The Armature is practically indestructible—the rolled copper bars being firmly anchored in the iron, with their ends brazed into channel-shaped rolled copper end rings of ample size. The shaft is sufficiently rigid to withstand the strain of gear and chain drives on shockloads.

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The engineers on this job realizing the advantages, not only in comfort but fuel saving, zoned the system of radiation and installed Arco Motor Valves and Mercoid Thermostats to control the steam supply to each zone. And in the various sections of the building where Unit Heaters are used, Mercoids were also installed to automatically start and stop fan motors in order to accurately regulate temperatures.

The selection of Mercoid Thermostats and Arco Motor Valves for this great modern building is a great tribute to their accuracy and complete dependability.

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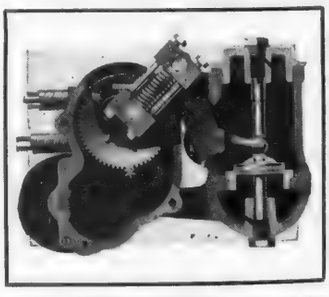
MERCOID THERMOSTAT No. 845. Cover removed. Room temperature type for accurate control of temperature in buildings, factories, offices and work rooms. Extremely accurate, dependable and completely free from all troublesome servicing.



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SKINNER engineers *originated* the Unit Method of Heating over 34 years ago. They have adapted it to thousands of open-space buildings of every structural type. They have studied and solved every imaginable kind of heating problem. Naturally such volume and variety of experiences have fitted them to plan the most effective heating even for the hardest-to-heat buildings.

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Making *all types* of unit heaters—floor type or suspended, steam or direct fired, prime or extended-surface coils—Skinner Brothers are in position to always recommend *the type* which *best fits your building.*

Recognizing these facts, you will know *why you cannot afford to plan heating without calling in a Skinner Man.*

There is a Skinner Air Heater to fit the heating needs of every type of open-space building

Skinner Bros. "Baetz Patent" Air Heater

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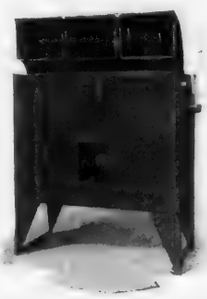

Skinner Bros. Type "U" Air Heater

Skinner Bros. Air Heaters

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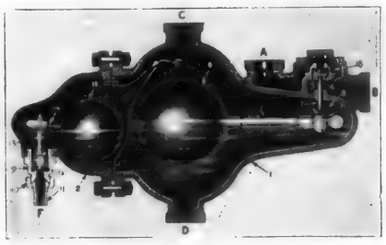
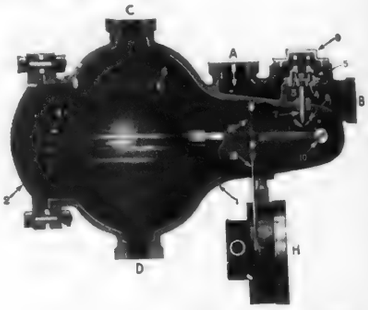
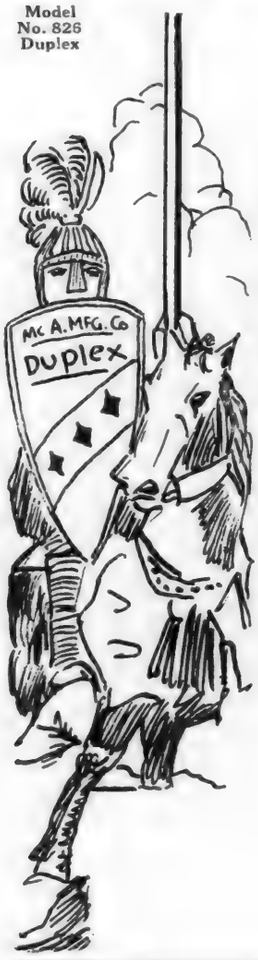




Model No. 826 Duplex



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"AGENTS WITH STOCK IN PRINCIPAL CITIES"

The Heating & Ventilating Magazine

Volume XXVI

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Number 4

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The Oil-Burner Convention

IT was a happy thought to bring this year's convention of the oil-burner industry to New York. The East has the reputation of being the last to yield to the progress of events, and then of assuming full credit for such progress. Be that as it may, it will do the East no end of good to see an oil-burner convention in action and to visualize for itself the character, the strength and the enthusiasm of the organizations which constitute this industry.

G. V. Almquist

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In the heating system of this garage there are 234 Type E

SARCO
Radiator Traps

In addition all unit heaters and drips are equipped with Sarco combination float and thermostatic Steam Traps.

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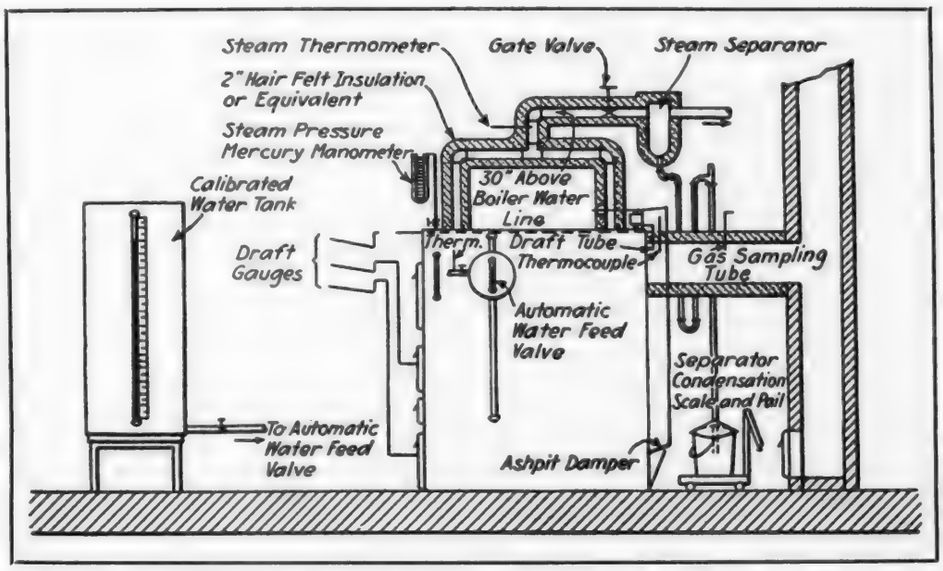
A MONTHLY JOURNAL OF ENGINEERING PROGRESS

The Heating & Ventilating Magazine

Volume XXVI APRIL—1929 Number 4

Why Two Boiler Testing Codes?

A Comparison of the Codes Approved by the National Boiler and Radiator Manufacturers' Association and by the American Society of Heating and Ventilating Engineers



Arrangement of Boiler Test Apparatus Specified in Code of National Boiler and Radiator Manufacturers' Association

IN January of this year the National Boiler and Radiator Manufacturers' Association approved and adopted a code for testing steam-heating boilers which had been drawn up by a committee of the association. In the same month the American Society of Heating and Ventilating Engineers, at its annual meeting held in Chicago, approved a revision of its 1925 boiler-testing code which was submitted by its Committee on Rating Low-Pressure Boilers. While this latter code was approved it has not been issued, and it can be assumed that before this is done the committee now having it in charge will give its wording the reconsideration usually necessary for the first printing of all codes.

It is unfortunate that there should be more than one code in use and it is worth while to compare these two to determine whether there is sufficient difference in their provisions to warrant the continued existence of both.

It can be stated at the outset that the committees

of both organizations evidently have attempted to produce a code which will give as true a picture of the operating characteristics of a boiler in service as can be obtained on the test block. It also would seem that the main differences in the two codes from the 1925 code of the A.S.H. & V.E., as far as their regulations may affect the results obtained, are based on the changes previously suggested by the Boiler Rating Committee of the society in its June, 1928, report.

There is but little difference between the two codes as far as their instructions and test limitations are concerned, and the numerical results obtained in two tests of the same boiler, one with each code, would be as nearly the same as duplicate tests ever are. Most of the differences are those of objective.

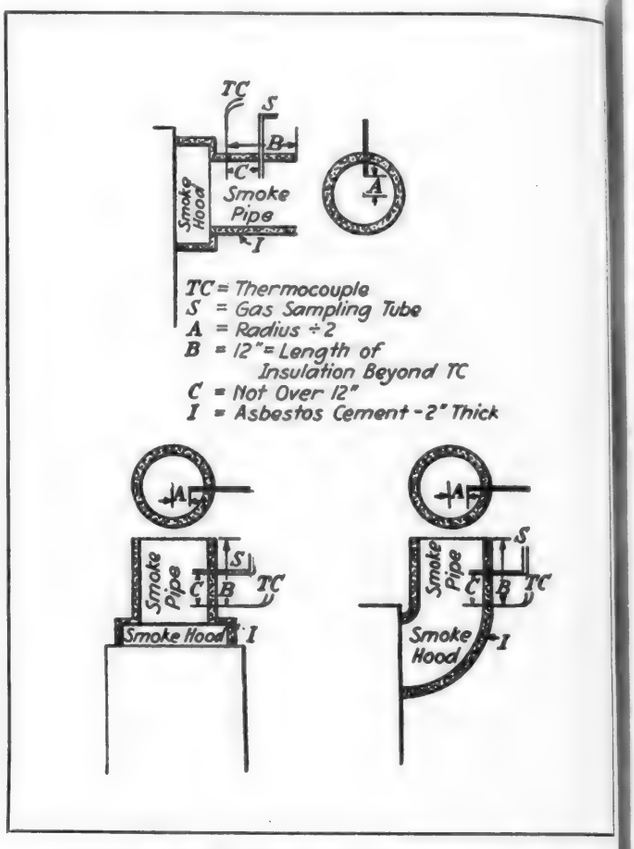
The society's code attempts to provide instructions for the testing of boilers, both on the test block and after installation; it provides for tests to determine a complete heat balance, and also for the more restricted purpose of determining only the efficiency and the main operating characteristics. The association's code is not so general. It has the single purpose of obtaining data for use by the manufacturer, and does not provide for tests to give complete heat balances. As a consequence, the association's code is the shorter, and more direct, since there is less occasion to provide for optional methods.

As stated, the two codes differ little in their regulations and instructions, and those few differences are not basic. Some of these will be pointed out and discussed, following the order used in the association's code. Comparisons will be restricted to the application of the codes to tests for the limited purpose of determining the operating characteristics and plotting performance charts.

Chimneys:

Both codes allow the use of induced draft. This is logical because, although it would be preferable to attach the boiler to the same size chimney as will be used in service, yet it is not practicable to provide the large number of chimneys that would be required. Moreover, any one boiler may be sold for installation under conditions requiring a lower maximum output than it is capable of, in which case a smaller chimney would be allowable; also the use of a given-size chimney for the test does not insure that the draft conditions will be the same as they would with the same chimney in service, because it may be necessary to run the test on a warm day.

Both codes attempt to guard against the incorrect use of an available high induced draft, the association's code by the clause that "means must be provided for reducing the draft so that the draft at no time exceeds that which would have been obtained with chimney as specified by the manufacturer," and the society's code by the statement that " . . . a suitable damper or by-pass in the test flue or chimney that will permit of the draft at the regulating stack damper being reduced to a little above that required for the output of the test which is being made." Although the intent of both codes is the same, yet the latter admittedly is a more practical possibility than the former.



Location of Gas Temperature Thermocouple and Gas Sampling Tube in N.B. and R.M.A. Code

Apparatus and Instruments:

The society's code goes into more detail but the set-up and instruments specified are the same in the two codes. The society's code allows the weight of water to be determined by weighing either the feed-water or the condensate. The association's code does not mention the latter method, but by inference does not forbid it.

The association's code calls for the gate valve in the steam piping to be between the boiler and the separator, whereas the society's code places it beyond the separator; the matter is not of great importance with low-pressure steam, but the question arises whether it is not more logical to put it beyond the separator in order to avoid any re-evaporation by expansion when the valve is used for reducing the steam pressure to atmosphere, and also to allow for a free flow of slugs of water to the separator; a pressure of 2 lbs., in the separator causes no difficulty in draining the condensate.

Neither code attempts to give as full details of apparatus, set-up and instruments as would be required by those not accustomed to test boilers. It is inadvisable, however, that they be included, because such information is common to other codes, such as those for testing boilers burning oil or gas. The society's Boiler Rating Committee has advised that a separate code covering apparatus and instruments be prepared; this is the method followed by

the American Society of Mechanical Engineers for its power boiler codes.

Fuels to Be Used:

The association's code specifies the fuels to be used although the limitations are so broad that in effect it does nothing more than advise the preferable size for each type of fuel. The society's code states how the fuel sampling shall be done but does not specify what fuels shall be used. This omission evidently is intentional and implies that the committee considered that there should not be limitation to permissible fuels in a code for testing; the fuels to be used are included, however, in the society's code for rating boilers.

New-Fire and Continuous-Fire Methods:

Both codes retain the option allowed in the society's 1925 testing code of using the new-fire or continuous-fire method. The association's code allows the new-fire method on tests with anthracite or coke, without limitations on the size of the boiler; the society's code includes the further limitation that the grate area of the boiler must not exceed 8 sq. ft., and it is likely the committee had in mind the difficulty of cleaning a large grate in a sufficiently short time. The new-fire method is not used to any extent and probably rarely on boilers with grates larger than 8 sq. ft. It should be possible to adjust difference of opinion on this limitation.

Instructions for starting and stopping a test when using the new-fire method essentially are the same in the two codes, but the society's is more specific, particularly for the water level which, it specifies, should be observed after the fire is removed; for small boilers this method is preferable to measuring the height of water when the boiler is steaming, because the entrain steam bubbles materially affect the water level and it varies with the rate of steaming.

In the society's code are given two alternative methods for determining the weight of equivalent fuel burned in the new-fire method; one is based on a direct determination of the calorific value of the residual fuel, and the other is based on computing the ash in the residual fuel from the percentage of ash as given by the proximate analysis of the coal fired; the association's code uses the latter method only. The first method manifestly is more accurate and allows of a check; the second is sufficiently accurate for the usual purpose of such tests and avoids the delay caused by having to obtain the calorific value of the sample from the residue.

Duration of Tests:

The greatest difference in the two codes is in the time specified for duration of the tests. The association's code calls for 250 lbs. of fuel per square foot of grate area to be burned in the continuous fire, and 150 lbs. in the new-fire method; the society's code specifies 140 lbs. and 100 lbs., respectively.

Accuracy in the numerical values of the efficiency obtained by a test depends largely on a correct measure of the weight of fuel burned, which again depends on the weight of combustible in the fuel bed being the same at the end as at the beginning of the test; the probable error due to this cause decreases as the weight of fuel fired during the test increases.

At least 250 lbs. of coal must be burned with the continuous-fire method to insure accuracy in the efficiency to within 2%, but such tests become rather onerous at low rates of burning, requiring 83 hrs. when burning fuel at the rate of 3 lbs. per sq. ft. per hr. and it is open to question whether the expense is warranted.

Apparently the society's committee desired to lighten the burden at the sacrifice of accuracy in the efficiency value, whereas the manufacturers themselves appear to be willing to stand the expense. The danger of insisting on too long tests is that it will not be followed by some users, and it may have been for that reason that the compromise was proposed by the society of having a sliding scale varying the weight fired with the rate of burning.

Computations:

The association's code bases its computations on the "net dry fuel burned," whereas the society's code uses "fuel as fired." Both methods of computation give the same final values, but the latter generally is used and is the more straightforward. The term "dry-fuel" and the calorific value associated with it does not mean that all moisture has been removed, but only such portion of it as is driven off by an arbitrary method of drying the fuel. There is, therefore, no advantage in using the dry basis and there is also the point that it is less confusing to deal with the fuel as fired.

Attendance to Fuel-Bed and Dampers:

Both codes specify the allowable attention to the fuel-bed and adjustments of dampers; this is necessary if uniform results are to be obtained. The general intent of the limitations is not to allow more attention than the boiler would receive in service when burning the fuel used in the test. The limitations are the same except that the association's code puts no restrictions on adjustments to the secondary air dampers, that is, to those which admit air over the fire, whereas the society's code forbids any adjustments other than when firing except for bituminous coal, for which one adjustment between firing periods is allowed. It permits, however, frequent adjustments of dampers of large boilers which will require the continued presence of a fireman.

During a test one can improve the efficiency by using a CO_2 meter as a guide and continually adjusting the secondary air to maintain the CO_2 at a desirable value. The user, however, will not have the ability or the facilities to do this and, as a general rule, it would seem more desirable to insist that the adjustments conform to those of service. The society's code calls for the tester finding the

setting that will give the best average results over a firing period and using that for the test; such a procedure will tend to accumulate data which will permit of the manufacturers giving more definite information to the purchase than is now the custom.

Drafts:

Both codes call for the measuring of the three drafts—ashpit, over-fire, and at the smoke outlets. The association's code, however, makes the value of smoke-outlet minus ashpit draft the important value for record. Here is a point for discussion on the ground that a computation of the chimney height should be based on the draft at the smoke outlet. Some boilers and fuels require a draft in the ashpit, produced by closing its dampers, in order to get sufficient secondary air through the slots; such boilers require more stack draft than do those not requiring an ashpit draft and, therefore, publishing the differential draft might be misleading.

Number of Tests:

The association's code calls for five tests at outputs to cover the range of capacity of each boiler; the society's code specifies not less than four tests. The five tests are preferable and, if all manufacturers are so agreed, that number should be adopted.

Definitions:

The society's code gives definitions for "grate area" and for "combustion rate"; that for grate area attempts to cover the various shapes of firepots found in commercial boilers and is based on the average area of the fuel bed. The association's code gives twenty-three definitions but does not define the above two; the most important one is that of "fuel capacity" and it is one much needed.

Both codes insist that the weight of fuel fired for one charge during a test should correspond to the charge for that fuel claimed by a manufacturer in his sales publications; this should eliminate the extreme claims for fuel capacity that sometimes have been made. A full set of definitions covering boiler and other heaters is needed, and the only question is whether a test specification for one type of fuel is the correct place for them.

Forms:

Recording data of boiler tests requires three operations or stages: 1, recording observations and values during the conduct of the test, and averaging or totaling the individual records; 2, computing results from the test data; 3, in addition one may wish to summarize or tabulate the results of several tests or present data on a general report form.

The society's code provides forms on which both the first and second operations would be done, and takes no cognizance of the third, that is, it goes no further than providing forms for each individual test on the assumption that the papers associated with each test will be kept separate from those of other tests. The association's committee has shown considerable ingenuity in devising forms which compound the three stages.

There is this to be said, that forms largely are a matter of individual taste, and their convenience depends on the number of observers on a test and on filing methods used by the firm. Forms used to record test data are likely to get dirty and, generally speaking, it is desirable to put the computation summaries on a separate sheet.

Conclusions

The foregoing comparison has shown that there is no material disagreement between the two codes, and that they could be brought to exact agreement; it is, therefore, unnecessary that both should remain in force. It is open to question as to what organization should issue the code and that, no doubt, constitutes a stumbling block in the present situation. The society's argument is that it is more logical to have the code issued by an organization that represents not only the manufacturers, but also the purchasers, contractors, and users, all having an interest in the code and a right to discuss its provisions.

Forced Circulation Electric Convection Heater Being Used in Great Britain

THE type of electric convection heater most generally used in the United Kingdom is the low-temperature tubular heater. A new development is the electro velocity radiator, a forced circulation heater, most of the heat emitted being by convection. The standard small model is of iron, and somewhat resembles a water radiator of the upright-tube type. Air enters at the bottom and is heated as it passes over nickel-chrome resistance elements fitted with radiating fins. Warmed air passes through three nozzles which give it a velocity of about 180 ft. per min. before being ejected from the top. The fins and nozzles are contained in upright tubes somewhat bell-shaped at the top. Final air temperatures range from 200° to 220° F., and the electric load is from 500 to 1000 watts. A large model, having six nozzles, consumes 1500 or 2000 watts, and three-heat control is provided. It is claimed that a room is heated at least twice as quickly with a velocity radiator as with a radiant heater of similar current consumption.

When an electric plug system is already in use the installation of the new heaters is quite a cheap matter, and they take the place of thermal-storage systems. The control is independent for each room, with resulting economy — especially where rooms are only used for comparatively short periods. The heater is suitable either for floor or wall mounting.

Central Heating *in Detroit*

Present Arrangement of the Company's Plants and Distribution System Based on Extensions Made During 1928

Rebuilt Willis Avenue Sub-Station and Heating Plant

By E. E. Dubry

Assistant Superintendent of Central Heating, The Detroit Edison Company

FOR those who are not familiar with local conditions in Detroit a review is necessary of the development of the central station heating properties in that city with particular reference to the extensions made during the year 1928.

In connection with the reorganization of the existing power generating and distributing facilities for the Detroit area in 1903, it was found that considerable spare boiler capacity would be available in the old Willis Avenue generating station, due to the erection of the Delray power house as the main source of electrical energy.

This condition presented an attractive means of establishing a central station heating system and led to the organization of the Central Heating Company in 1903. The company, as organized, owned and operated the system but purchased its exhaust steam from the Edison Illuminating Company. The latter having some demand for D.C. energy in this district, planned to generate it at Willis Avenue and sell the exhaust steam for heating purposes in the immediate neighborhood which was, at that time, a high-class residential district.

The following year the Farmer Street heating plant and its distribution system was started in the downtown business district to supply electric customers with heating service, thus eliminating the necessity of maintaining boiler equipment for heating purposes only, since many of them were purchasing all of their electrical energy. This service became so popular in the business district that it became necessary to start the Park Place heating plant in 1912.

At the time the Farmer Street plant was started, another company was organized and erected a plant at the corner of Cass and Congress Streets for the purpose of generating power and selling steam for heating. This property was purchased by the Detroit Edison Company in 1914, and rebuilt in 1917.

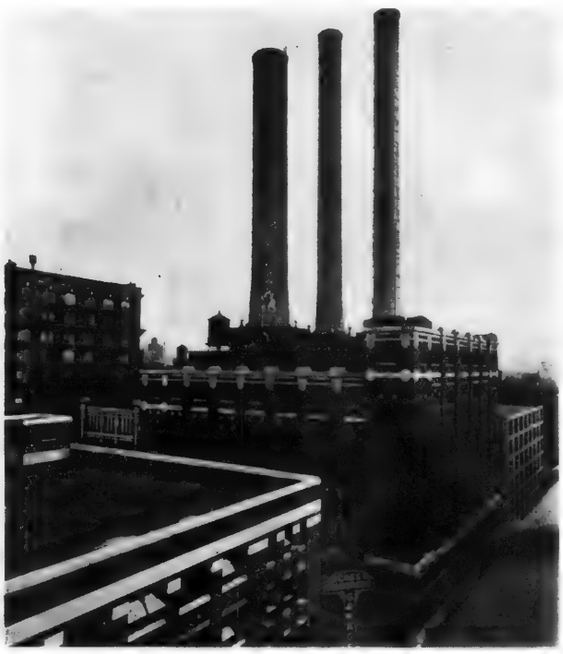
All of the plants and business of the Central Heating Company were bought by the Detroit Edison Company in 1915. Additions to the existing plants constantly were being made from that time to provide for the steadily-increasing demand for the heating service.

In the fall of 1926, the Beacon Street plant went into operation and during the same year the Farmer Street plant was taken out of service because of the high cost of operating its eight 500-H.P. boilers at 160% rating, in comparison to the operating cost of the 4155-H.P. units at Beacon Street at about double this rating.

The following year more boiler capacity was required and another unit installed at Beacon Street while, at the same time, the operation of the Park Place plant was discontinued because of the high operating cost of its eight 727-H.P. boilers.

When both of these older plants were designed they were considered quite modern but the equipment available at that time did not give these plants sufficient flexibility in operation to follow the normal heating load without excessive banking losses.

Another handicap of the older plants was the low maximum continuous boiler rating, due partly to the equipment but also to the boiler water condi-



Congress Street Heating Plant Having a Rated Boiler Capacity of 11,407 B.H.P.

tions as affected by a feed-water make-up of over 90%. With modern methods of feed-water treatment the limit of boiler rating due to this condition has not been determined.

Although the finished plant investment per boiler horsepower installed at Beacon Street was greater than the corresponding figure in the older plants, the difference in plant output, efficiency and operating cost made the change economically attractive, the largest single item being the reduction in plant operating wages. By adding one fireman to each shift at Beacon Street during the peak season only, it was possible to abolish the entire plant organization of one of the older stations with considerable extra capacity added to the system.

In 1928, the plant serving the General Motors Building was purchased by the Detroit Edison Company and is now known as the Boulevard heating plant.

Coaling Stations

Of the four existing heating plants only the Boulevard plant is served by a railroad siding; the other three must have coal transported to them by auto trucks from either of the two coaling stations.

From an engineering standpoint the Beacon Street plant could have been located on a railroad siding $\frac{5}{8}$ of a mile from its present site, but the fixed charges and investment necessary to provide sufficient steam mains from the plant to the distribution system was more than the investment and fixed charges in connection with a new coaling station located on a railroad siding.

Both of the present coaling stations convey the coal by means of belts from the unloading hopper to a crusher and then to an overhead storage bunker, the Third Avenue station having a storage capacity of 2300 tons, while Fort Street can store 7400 tons. This coal is crushed and ready for delivery to the heating plants and serves as a reserve supply against an emergency breakdown of crusher or railroad equipment, the daily unloadings being approximately equal to the daily plant requirements.

All the coal is hauled from the coaling stations to the heating plants in rectangular steel boxes which hold about six tons of crushed coal. These boxes are of such a size that they will fit into any standard truck body or on a trailer.

At the plants these boxes are hoisted to the bunker elevation and emptied into coal hoppers from which the coal is carried to the boiler bunkers by means of belt conveyors or as at Beacon Street, the boxes are carried to the coal bunker by means of a monorail crane, and emptied directly into each individual bunker.

Ashes are emptied from each furnace ash hopper directly into auto trucks. For the last several years all ashes have been sold at the hopper with no plant labor required whatever except for the operation of the ash gates when loading the trucks.

All of the heating plants take water directly from the city water mains. Two mains with separate sources of supply serve each plant so as to provide against shutdowns. Two plants have sufficient storage capacity to operate at maximum output for three hours without receiving any water from the city mains; the other two can operate in a similar manner for three hours.

Willis Avenue Heating Plant

The Willis Avenue heating plant was the first one in Detroit and although the original land is still in use, all the original equipment and building has been replaced by a modern plant. The rated boiler capacity installed as of December 31, 1928, is as follows:

Two 1300-H.P.; one 1543-H.P.; one 2520-H.P.; one 2565-H.P., and one 120-H.P. The last unit is used during the summer months only.

Beacon Street Plant Built in 1925

The 2565-H.P. unit was installed during the year 1928, and also the last one-third of the rebuilt boiler house was completed, giving sufficient space for one more 1300-H.P. unit to be installed at some future date. The station main steam piping and reducing station was rearranged to provide for the new and future units.

This plant supplies an old high-class residential district which has developed into rooming houses, apartments and small miscellaneous stores and shops. In this part of the system the central heating requirements are increasing very slowly in comparison to the remainder of the system. The station also supplies the spare capacity of the recently-acquired Boulevard plant.

All of the boiler units are of the type W, three being built by Babcock & Wilcox Company, one by the Connelly Boiler Company and one by Combustion Engineering Corporation. Taylor underfeed stokers and D.C. motor drives are included in the equipment. All forced and induced draft fans are D.C. motor driven, while boiler-feed pumps are both motor and steam driven.

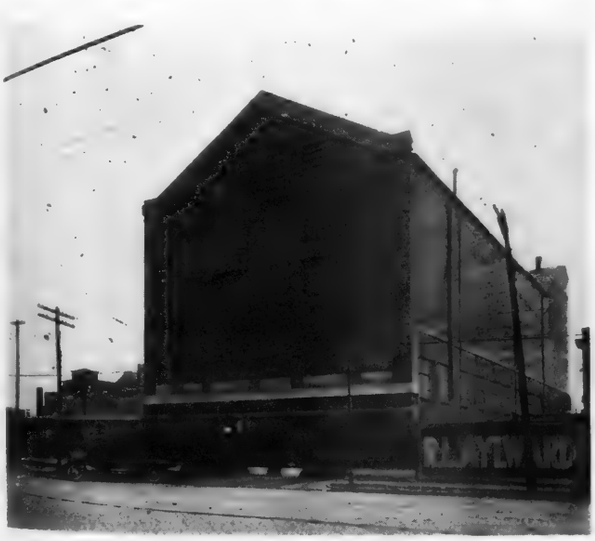
One 500 K.W.D.C. generator, exhausting either to the system or to the feed-water heater now is installed, with provisions made to install a 1000-K.W. unit this year. All excess energy is delivered to a substation located on the same property.

Make-up water at this plant is 100% because of the difficulty and expense of returning the condensate to the plant. Soda ash is the only feed-water treatment used, although Hoppes purifiers are installed in which most of the scale is deposited from the water on its way to the boiler. The safe maximum continuous boiler rating is 225%.

During 1928, this station burned 29,669 tons of coal and delivered 507,919,000 lbs. of steam to the system.

Congress Street Heating Plant

In the Congress Street heating plant are 11,407 rated B.H.P. installed in six units as follows, the last unit being erected in 1923. Three 1300-H.P. Babcock & Wilcox boilers; one 1543-H.P. and two 2982-H.P. D. Connelly Boiler Company boilers.



Fort Street Coaling Station which Has a Storage Capacity of 7400 Tons

Boulevard Heating Plant which Supplies Part of the Steam Used by the Nearby General Motors Building

In its general layout the plant is similar to the rebuilt Willis Avenue station. The make-up feed-water is about 90% since some condensate is returned from those buildings adjacent to the tunnel system. Hoppes purifiers are used with a soda ash feed. 225% boiler rating is considered as the safe maximum continuous boiler output. All auxiliaries are motor driven, except some of the boiler-feed pumps which are driven by steam turbines.

A 750 K.W.D.C. generator is capable of exhausting either to the feed-water heater or to the system, and all excess energy is delivered to an adjacent substation.

During the year 1928, this station burned 61,318 tons of coal and delivered 1,284,771,000 lbs. of steam to the system. There have been no additions or changes during the last year, although there have been steady increases in steam requirements of the district served by this plant.

Beacon Street Heating Plant

A rapidly-increasing public demand for heating service and the need of abandoning the two older plants, Park Place and Farmer Street, made a new plant imperative, and in 1925, the construction of the Beacon Street plant was begun. Past experience had made it appear more desirable to concentrate the plant capacity in three or four larger plants located at carefully-selected points, rather than in several small plants, each with its proportionally-greater overhead burden of land, building and supervisory personnel.

The Beacon Street plant is designed to care for the growth of load over a large part of the system

for many years to come, by the addition of boiler units from time to time. With the high-velocity feeder method of steam distribution it becomes possible to concentrate large amounts of steam-generating capacity at a single point, which would be out of the question were so much steam to be transmitted at low pressures. The ultimate output of Beacon Street when fully developed will be of the order of three million pounds of steam per hour.

Operating conditions of a district heating plant impose certain requirements and restrictions upon its design which are not encountered in the design of power plants. The controlling element, of course, is the poor annual load factor. Under Detroit weather conditions the plants must be adequate for temperatures as low as —16° F., whereas the average temperature for the heating season is 38.55° F. Consequently such things as economizers, air preheaters and other costly devices intended to save coal are not profitable investments. Not enough coal is burned, at prevailing prices, to warrant their use.

The boiler units at Beacon Street are simple in design, and are intended for large capacity, rather than extremely high economy.

Another feature peculiar to district heating plants is the large amount of make-up water amounting, at Beacon Street, to about 90% of the boiler feed. Proper treatment of the feed-water to prevent scale formation is extremely important. Zeolite treatment was chosen as being the most certain method in that respect and the operating results have amply justified that decision.

Electricity Generated As a By-Product at Beacon Street Plant

Opinion and practice differ on the desirability of generating electricity as a by-product in a district heating plant. Clearly, there is an overall thermal economy in passing the steam through turbines before distributing it for heating purposes. Whether or not this is sufficient to make the turbines, with their foundations and building space a profitable investment, will depend upon local conditions. In the Detroit plants it has appeared desirable to generate electricity upon a moderate scale, taking advantage of the moderate differential between boiler pressures and distribution pressures without resorting to high-pressure boilers with their added costs and complications. At Beacon Street a turbine is installed to act as a pressure-reducing valve on the most heavily-loaded feeder and a considerable amount of by-product electricity is generated and delivered to the company's electrical system.

At this plant the rated installed capacity is 12,547 B.H.P., consisting of two 4155-H.P. and one 4237-H.P. boilers. The plant went into service in 1926, and although there have been no additions to the major equipment this year, work is well under way for the installation of the fourth boiler of 4155-H.P. for 1929. Boilers are of the type W design with double-ended Taylor stokers.

Boulevard Heating Plant

This plant was purchased from the General Motors Corporation and, together with its new distribution mains, is an addition to the system during the year 1928. It consists of four 500-H.P. Babcock & Wilcox boilers with Westinghouse underfeed stokers.

Coal is delivered on a plant siding and after being crushed is taken to overhead bunkers by a bucket conveyor. Fans and stoker drives may be either motor or steam driven while the boiler-feed pumps are steam driven.

This plant supplies part of the steam to the adjacent General Motors Building, Fisher Building and other jobs, the remainder being supplied by a 16-in. line connecting with the Willis Avenue district.

In a succeeding article, Mr. Dubry will describe the Detroit Edison Company's steam distribution system, including the extensions made during 1928. He also will have something to say on the results of the company's service policy.

Oil Production in Western Hemisphere To Be Cut This Year

PLANS to end the overproduction of oil in the Western Hemisphere crystallized, March 26, in a compact entered into by the principal producers, who pledged themselves to limit production in the current year to the output of 1928. The curtailment program, drafted by four regional committees representing 80% of the potential production in the United States, Mexico and South America, was adopted unanimously, after stormy sessions, by the directors of the American Petroleum Institute.

Sir Henri Deterding, managing director of the Royal Dutch-Shell Companies of Europe, threatened at one time to upset the committees' recommendations but he emerged from the conference proclaiming adherence to the agreement. Sir Henri represented not only the extensive Shell interests in this country, Mexico, Venezuela and Colombia, but also was spokesman for a major part of the petroleum industry of Europe.

The conservation movement especially concerns the Western Hemisphere where there has been the greatest overproduction of oil. However, the success of the program to be carried out depends, to a large extent, on the cooperation of foreign producers, and it is expected that the next step will be a world-wide agreement on oil production.

In 1928, the average daily production was 2,453,051 barrels, and this production is to be maintained during 1929. This means that oil production will be decreased somewhat for the remainder of the year, as the daily production for the early months of 1929 has been about 200,000 barrels in excess of the above figure.

Engineering Aspects of Unit Heater Design

Application of Stack-Draft Principle Shows Importance of Limiting Final Air Temperature and of Keeping Air Streams Shallow and Turbulent, of Relatively High Horizontal Velocity, but with Definite Downward Deflection

By Charles A. Carpenter

Carpenter & Byrne, Pittsburgh, Pa.

UNIT heaters have become popular devices for industrial heating because they have reduced the first cost of installation and in most cases have given more satisfactory results.

When an industry has such a phenomenal growth as we have witnessed in the unit heater business, many conflicting claims are made concerning the respective merits of various designs developed for purely commercial reasons. It is the purpose of this article to point out a few basic engineering principles involved in unit heating.

In the first place, the heating of large spaces by radiant heat alone is necessarily unsatisfactory. Consequently, heating by convection has been the natural aim of modern science. Heating by convection implies the transfer of a concentrated supply of heat from some medium, such as steam, to an air current and thence by diffusion to the air in the building.

Naturally, an over-emphasis has been placed on the prime heating element. Early designs of unit heaters stressed scientific advantages of various heating surfaces, coil designs, etc. All these things are of academic interest but the user primarily is interested in the effect upon the air temperature and air circulation in his building.

A scientifically-perfect heating surface, in comparison with a most crude design, is of interest if it saves investment, maintenance, space, operating cost, etc. It is of no particular interest to the user simply because it extracts the last B.T.U. per square foot of heating surface. The purchaser is not buying B.T.U. per square foot but is buying satisfactorily-warmed air for his building at lowest cost.

Simply by way of summary it is obvious that the heating surface of a unit heater should be:

1. Safe, so that life and limb are not put in jeopardy.
2. Durable, so that depreciation becomes a small item of annual cost.
3. Suitable for the steam pressures encountered.
4. Rugged, so as to reduce maintenance.
5. Reasonably efficient, so as to minimize cost and space.
6. Relatively inexpensive.

A survey of recent trends in heater design shows clearly that there is a definite movement away from the theory of heating surfaces toward the theory of heating. By the use of a heating element predicated on efficiency of heat transfer alone one or two distinctly harmful effects occur. The temperature of air leaving the heater becomes high, the fan horsepower becomes excessive, due to pressure-drop through such a surface, the coil may become gas- or air-bound if not carefully built for steam circulation, and the warm-air velocity at exit from the heater may be too low.

Heating Effect—Not Heat Transfer Alone—Should Constitute the Basis for Unit Heater Design

Detached entirely from theories of heating surfaces and merchandising propaganda, the big feature of a unit heater is its stream of warmed air emerging from the outlet. What are these dispensers of heat doing for the user? That is the prime question.

Warm air released in a room as it leaves a radiator, unit heater, warm-air duct, or what not, is buoyant, like a piece of dry cork submerged in a body of water. This buoyancy immediately causes an upward circulation. The exact rate at which warm air will rise depends upon too many variables to justify any attempt at exact rationalization, but the initial upward tendency upon release from the heater may be approximated.

We can analyze a stream of warm air entering cooler air as being influenced by the same laws that govern stack draft or, carried to still more basic fundamentals, as being forced upward just as a fishing cork bobs up to the surface if the fish gets away.

A formula governing stack draft may be expressed thus

$$V = 480\sqrt{H}\sqrt{\frac{T_1 - T_2}{T_2}}$$

V = velocity in feet per minute
H = height of warm air column in feet
T_1 = air temperature leaving heater deg. F. absolute
T_2 = surrounding air temperature deg. F. absolute—approximately room temperature if heater recirculates, and outside temperature if heater draws fresh air only.

This formula is given by Warren Webster & Company in their text book entitled "Steam Heating."

By proper mathematics it may be shown that this formula is identical with the formula for stack draft given in Babcock & Wilcox Company's text book "Steam."

$$D = 0.52\ H.P.\left(\frac{1}{T_2} - \frac{1}{T_1}\right)$$

= draft in inches water gauge

$$\text{Taking } V = 4000\sqrt{\frac{T_1}{530}}\sqrt{D} \quad \text{and}$$

P = 14.7 lbs., this formula reduces to

$$V = 480\sqrt{H}\sqrt{\frac{T_1 - T_2}{T_2}}$$

These formulae show that a thin air stream is very much less buoyant than a thick air stream and, therefore, a heating system delivering warm air from a number of shallow outlets with suitable deflection and relatively high horizontal velocity would distribute the warm air without a rapid rise above the level of the outlet. It also follows that with a proper horizontal velocity at a correct point of application a very large area of warm air would be exposed to the cooler air in the building, which would make rapid diffusion and effective heating.

It also is interesting to note that the above formula for the velocity due to stack effect, taking $T_2 = 60°$ F., reduces to $V = 21.05\sqrt{H\ (T_1 - T_2)}$ whereas if T_2 be taken as 0° F.

$$V = 22.38\sqrt{H\ (T_1 - T_2)}.$$

A table is given for recirculation of 60° air with various heights of air columns and various warm-air temperatures—T_1 ranging from 90° to 200° F.

The writer believes that time is an important element in the theory of heating. Visualizing relatively thin streams of warm air delivered at some suitable elevation, with a downward deflection to offset buoyancy and with sufficient horizontal velocity to cause a sustained air drift, it is evident that the warm air can be given sufficient time to diffuse with the cooler air in the building in the breathing zone to accomplish satisfactory and efficient heating.

It should be noted at this point that the recirculation through a floor mounted unit heater permits the use of less radiating surface because the coolest air passes over the coils. This feature has its bearing on price provided that it is not offset by adverse factors.

In order to emphasize the importance of stratification, a table is given below showing the effect of varying increases in temperature for various heights above the floor when maintaining 60° at the 5 ft. level. This table shows the temperature assumed at the floor,—zero feet—and the last column shows the average building temperature for a height of 30 ft.

Table 2.—Effect on Stratification of Various Increases in Temperature for Various Heights Above Floor, When Maintaining 60° at the 5-Ft. Level

	Height Above Floor, in Feet									
	5	5	10	15	20	25	30	35	40	30 average
0.4	60	58	62	64	66	68	70	72	74	64
0.6	60	57	63	66	69	72	75	78	81	66
0.8	60	56	64	68	72	76	80	84	88	68
1.0	60	55	65	70	75	80	85	90	95	70
1.2	60	54	66	72	78	84	90	96	102	72
1.4	60	53	67	74	81	88	95	102	109	74
1.6	60	52	68	76	84	92	100	108	116	76
1.8	60	51	69	78	87	96	105	114	123	78
2.0	60	50	70	80	90	100	110	120	130	80
2.2	60	49	71	82	93	104	115	126	137	82

A cursory glance at the facts reveals that air at some such temperature as 120° F. entering a room at 60° has an incipient buoyancy velocity over 100 ft. per minute. No wonder a downward deflection of warm-air currents is necessary to affect floor-level temperatures, except by overheating the roof.

A further study of natural stack draft shows that floor-mounted unit heaters, when recirculating the air in a building, do not pull the heated air through the breathing zone unless the downward circulation

Table 1.—Recirculation of 60-Deg. Air with Various Heights of Air Columns and Various Warm-Air Temperatures

For 60° Recirculation—Incipient upward velocity V Leaving Temperature, Deg. F.

Height in feet	90	100	110	120	130	140	150	160	170	180	190	200
1	115.29	133.14	148.84	163.05	176.12	188.27	199.70	210.49	220.77	230.58	239.99	249.06
1½	141.20	163.05	182.29	199.70		230.58		257.80		282.41		305.04
2	163.05	188.27	210.49	230.58	249.06	266.26	282.41	297.68	312.21	326.10	339.41	352.22
5	257.80	297.68	332.82	364.58	393.80	420.99	446.52	470.67		515.61		556.91

Table 3.—Values of K for Various Unit Heater Conditions

	870 R.P.M. Inches, w.g.				1160 R.P.M. Inches, w.g.				1750 R.P.M. Inches, w.g.			
C.F.M.	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00	0.25	0.50	0.75	1.00
1500	1195	711	524	423	1594	948	699	564	2405	1430	1055	850
3000	1691	1005	742	598	2254	1340	989	797	3401	2022	1492	1202
5000	2183	1298	957	772	2910	1730	1277	1029	4390	2610	1926	1552
10000	3087	1835	1354	1091	4116	2447	1805	1455				2195

at the heater intake were to be a veritable gale. Such heaters may handle from ½ to 1 sq. ft. of floor space per C.F.M. of warmed air delivered, meaning a downward pull of 1 to 2 ft. per min. against a tendency to rise 100 times as great.

From the theory of buoyancy we may deduce that a unit heater should deliver air at a final temperature not too high, with air streams that are shallow and turbulent, with relatively high horizontal components of velocity, but with a definite downward deflection.

Having transferred a concentrated amount of heat from steam to air in a unit heater, it is of utmost importance to get the heat transferred from the warm-air outlets to all parts of the building needing heat. Here is where research work might profitably be carried on.

What are the best outlet arrangements? What angles of deflection are best? What type of air stream induces the greatest circulation of surrounding air?

This matter of induced circulation has a great bearing on efficient heating. A properly-designed jet of warm air blown into a building at suitable elevation, velocity and angle of deflection would create a tendency toward a vacuum all around the outlet. Obviously, natural pressure differentials would cause a return circulation partly between the floor and the outlet and partly above and alongside the outlet.

It is in the realm of heat transfer beyond the heater outlet that immediate gains may be made for industry.

As is well known, unit heaters are equipped with fans for two purposes, first, to increase the rate of heat transfer through the heating surface, thus emphasizing the reduction in first cost and, second, to permit better handling of the delivered warm air, considering velocity and direction.

Fans for unit heaters involve much misunderstood engineering. With low-resistance heating surfaces large volumes of air can be circulated most efficiently by means of propeller-type fans, and sufficiently high outlet velocities may be obtained to give wide distribution of heat. Fan engineers clearly recognize that the unit heater is a problem for ultimate solution by some fan having the essential characteristics of the propeller fan.

The use of multivane fans in unit heaters resulted primarily from the old high-resistance heating surfaces now quite generally discarded. An investigation of multivane fans for unit heaters by means of the theory of specific speed will make this clear.

$$\text{Specific speed "K"} = \frac{\text{R.P.M.}\sqrt{Q}}{79.72h^{3/4}}$$

R.P.M. = revolutions per minute
Q = cubic feet per minute of air delivered
h = equivalent water gauge produced at 70° F.

Desirable specific speeds for double-inlet fans range from 500 to 1500 R.P.M., forward-curved fans in general having lower and backward-curved fans having higher values. Best efficiency occurs near a value of 500 R.P.M. and at 1500 R.P.M. the efficiency falls off 40% to 50%.

Table 3 indicates that backward curve blading is desirable for the higher direct-connected speeds, that the multiple fan unit consisting of two to four fans is a necessary evil and that the very low draft loss heating elements virtually eliminate the multivane fan from consideration.

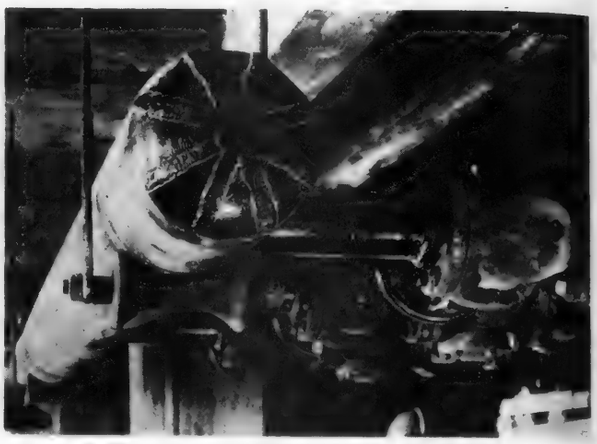
Reduction of Stratification Will Reduce Power Requirements

In a normal industrial plant the cost of power to drive unit heaters rarely will amount to more than 5% to 15% of the cost of steam condensed if steam is supplied directly from the boiler. A reduction in abnormal stratification or a large difference between floor and ceiling temperature so often in evidence readily may remove power as a factor in the consideration of unit heaters.

To the observer it must be apparent that the warmed air must be blown in a downward inclined direction, whether or not the heater be arranged for recirculation at the floor. It is evident that the horizontal component of the outlet velocity influences the range of effective distribution of heated air.

At the present time there appears to be an exaggeration of the importance of recirculation at floor level. It is only necessary to consider the large number of installations of heating equipment involving 100% fresh air supply to realize that floor circulation cannot be as important as is frequently claimed. In fact, as has been stated, a unit heater with fresh-air intake, in general, will have a lower final temperature than when recirculating and, not infrequently, will give more uniform temperature in the building as a result of the reduction in buoyancy.

Two 2-Weld Elbows in Line Shown in Fig. 32, St. Luke's Hospital Installation



Round Bull Plug in Line Containing All-Welded Flanges

Welding *for the Heating Contractor*

Part VI—Typical Installations Showing Application of Welding to High- and Low-Pressure Piping Systems

By Horace E. Wetzell

Chief Engineer, The Smith & Oby Company, Cleveland

IN this article, which concludes Mr. Wetzell's series on welding, the author has described and photographed some difficult piping problems where welding simplified the heating contractor's work and reduced his costs. In previous issues the author has compared the advantages and disadvantages of electric and oxy-acetylene welding and presented complete data on the strength of welded joints. Discussions of the stresses in building piping and the importance of good welding operators have been treated in an interesting and thorough manner. Contractors were told in detail just how to make the various welded joints, how to take off branches, connect risers and weld in bends. Last month Mr. Wetzell compared costs and weights of welded and screwed joints and told of the advantages of welded joints in weight and resistance to corrosion.

THE new Ohio Bell Telephone Building in Cleveland, O., rises more than 360 ft. in the air and has three basement floors. Steam for the heating system is piped from a central power-plant through the streets to the building. Fig. 28 shows the 16-in. steam-line immediately after entering the building. Also it shows a three-weld elbow and a 16-in. steel flange welded to the pipe for a valve connection. Fig. 29 shows the high-pressure header to the right, four 8-in. pressure-reducing valves properly valved and one 8-in. valved by-pass.

All the flanges shown are welded to the pipe and all branch connections are welded. Fig. 30 shows workmen after they have completed the aligning of pipe for a 16-in. plain butt-weld. The joint is now ready to be tacked and welded.

The steam line then rises, full size, for 250 ft. The line is anchored at the bottom and all the expansion is directed to the top where an expansion joint is provided. The riser weighs 17,000 lbs. and is supported as shown in Fig. 31. The anchor as shown is not completed. A friction clamp of 12-in. x $\frac{5}{8}$-in. steel is placed around the pipe and is supported from the steel work as shown. These supports were heavily welded to the structural steel.

Fig. 28. Three-Weld Elbow in 16-In. Steam Line, Ohio Bell Telephone Building

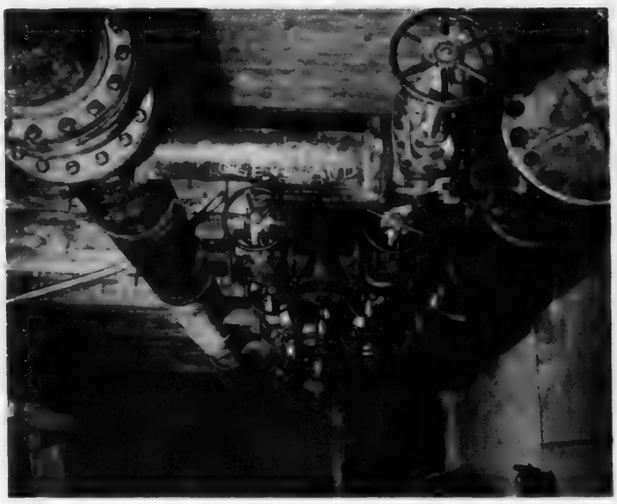


Fig. 29. Welded Connections Taken Off the High-Pressure Header

Above the friction clamp a welding ring (not shown) made in halves out of 4-in. x $\frac{5}{8}$-in. stock with eight 1-in. holes punched out, is placed about the pipe. The halves are welded together and the holes are filled with weld metal, with good fusion between this weld metal and the pipe. This gives direct shear equal to the area of the eight 1-in. holes. The riser, shown in Fig. 31, supplies steam to a 10-in. main which entirely encircles the building in the pipe space between the fifteenth floor and the sixteenth floor. The downfeed riser connections are welded into the lower half of the 10-in. main at an angle of 45°. The upfeed riser connections are taken from the upper half.

The refrigerating system in this building uses carbon dioxide as its refrigerant. The high-pressure, hot discharge-line is under about 1200 lbs. pressure. Extra-heavy pipe was used and all joints were electrically welded. The pipe bends were made by the application of heat from an oxy-acetylene welding torch. The only possibility for leaks in such a system is at the valves.

St. Luke's Hospital Building

The new St. Luke's Hospital of Cleveland is an unusually well-equipped institution. Steam is generated in a battery of three boilers at a pressure of 200 lbs. The main header (not completed) is shown in Fig. 32. This pipe is of extra-heavy weight. The butt-welds in the header and connections for the two bends in the boiler leads are first welded and then provided with a steel sleeve which also is welded to the pipe. Two 2-weld elbows in this line are shown in the headpiece, Page 74.

A fine example of a round bull plug is also shown in the headpiece. All flanges in this assembly likewise are steel and are welded to the pipe.

Cold-Storage Warehouse Building

Another unusual job which was carried forward to a successful completion consisted of the piping for a cold-storage warehouse. The building was twelve stories in height, 220 ft. long and 180 ft. wide. The lower six floors are heated while the upper six floors are refrigerated. Piping for both heating and refrigerating systems was welded. The cooling surface consisted of approximately 24 miles of a 2-in. full-weight pipe. The pipe was welded end to end in a flash-type butt-welding machine. The return bends for these coils consisted of pipe

Fig. 30. Workmen Tacking in Joint to Be Butt-Welded After Aligning the Pipe

Fig. 31. A 17,000 Lb. Riser Supported by Anchor, Later Welded to the Steel Beams

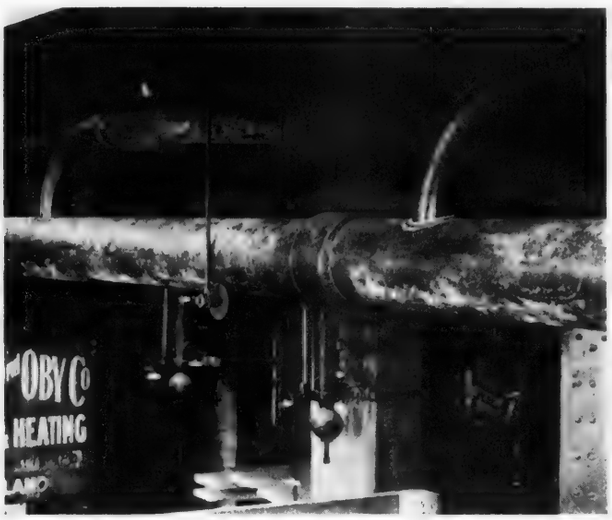


Fig. 32. Extra Heavy Main Header, Showing Sleeve Over Butt-Welded Joint

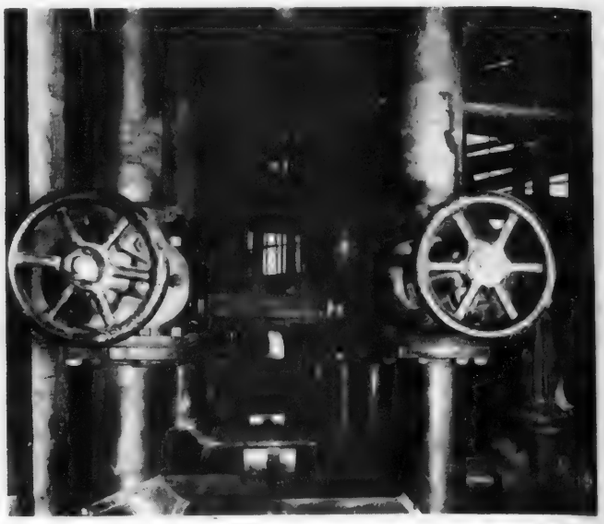


Fig. 33. Brine Pipe Line for Refrigerating Plant Showing Welded Elbows

bends, bent to very small radii. Enough tangent was allowed in the bends so that they could be welded to the pipe in the butt-welding machine. There were two complete systems of brine circulation, one for high temperature (15° F.), the other for low temperature (12° F.).

The brine mains with their branches were mostly welded.

The machinery for the ice plant was located in a power house separate from the main building and all services to the building passed through a tunnel. Brine was so piped that any one of the three circulating pumps could be used either for the high-temperature system or the low-temperature system. A view of this part of the piping is shown in Fig. 33.

The ammonia and cooling-water piping were likewise welded. Fig. 34 shows a few of the butt-welds made in the ammonia lines. The view shows the low-pressure suction, high-pressure suction and the multiple-effect headers.

Conclusion

The installations herein described have been in operation for some time. Absolutely no trouble has been experienced with the welded piping. Theory shows that such piping should be entirely satisfactory. Actual installations prove that welded piping is practical. The purely experimental stage has been passed and every piping contractor should be in a position with an organization to make welded joints. Welded piping now can be classified as "standard practice."

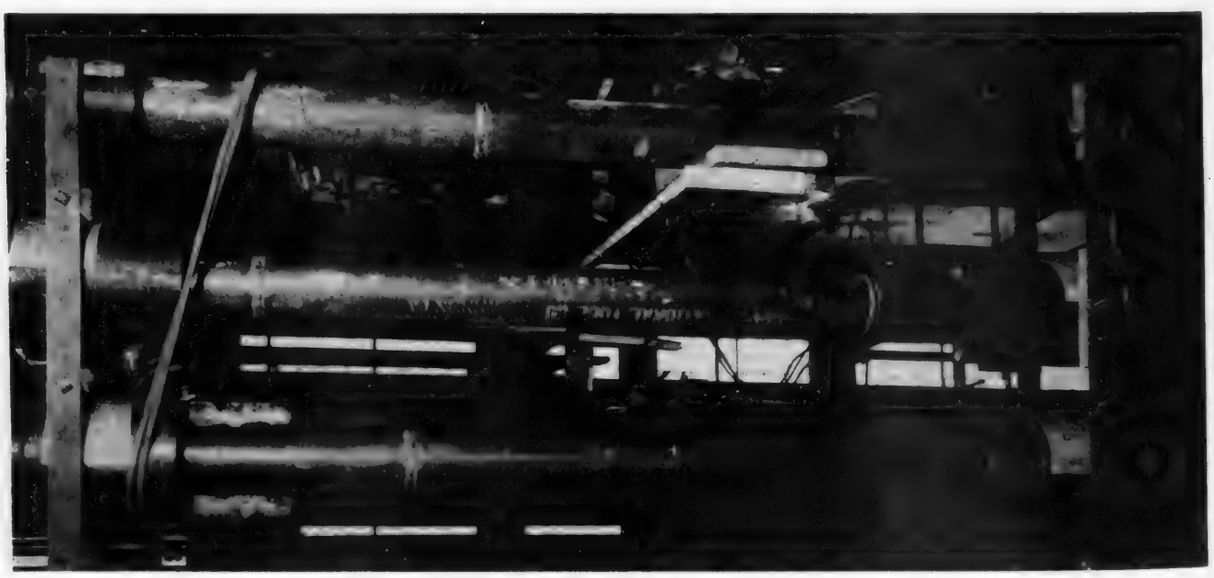


Fig. 34. Butt-Welds in Ammonia Lines Simplify Application of Insulation

Dean Bliss speaks from an intimate knowledge of domestic oil burning. He was in charge of the oil-burner survey conducted in 1926 for the Popular Science Institute of Standards, and had the opportunity of observing the merits and defects of thousands of oil burners of many makes and types.

Present Status of Domestic Oil Burning

An Interview with
Collins P. Bliss
Associate Dean, College of Engineering, New York University

IN an effort to give the readers of THE HEATING AND VENTILATING MAGAZINE a picture of the present status of the domestic oil burner, we asked Dean Collins P. Bliss, of the College of Engineering, New York University, to give us the benefit of his experience, both that gained through laboratory tests at New York University and in his field surveys. At his suggestion, THE HEATING AND VENTILATING MAGAZINE prepared a questionnaire on the subject, which, it was felt, would indicate more clearly than any other method the scope of the article we desired.

To our gratification, Dean Bliss has replied to the questions categorically, and both the questions and replies are here passed on to our readers as an authoritative and succinct expression regarding the present status of domestic oil burning and what trends we may look for in the future.

Question 1. Why is it difficult to compare oil burners satisfactorily through laboratory tests, and better to make a survey of actual installations?

Answer: Laboratory tests on oil burners mean nothing to the general public because the variations in the performance of oil burners are affected more by the variables found in the plant where the oil burner is installed than in the oil burner itself. Efficiencies and performance of practically all of the approved oil burners on the market do not vary sufficiently to warrant a laboratory test, which would mean nothing to the actual user of the burner. The user is much more interested in what a particular burner will do in his home than in what it did or might do in the manufacturer's laboratory or in that of a university. A carefully-conducted survey with a well-prepared questionnaire, faithfully and honestly answered, gives much more information about the every-day performance of an oil burner and its practical efficiency than could be furnished by the most exhaustive laboratory tests.

Question 2. On the whole, what would you say oil-burner manufacturers are doing that is wrong? Are there too many attachments to get out of order on a modern oil burner? Is there such a thing as making an oil burner "too automatic"?

Answer: Of course, all devices that depend on several mechanical operations, of necessity, must be complicated. Demands of building departments and fire prevention authorities have forced oil-burner manufacturers to add safety devices which have complicated the otherwise rather simple performance of the oil-burning process itself. In fact, most of the complicated mechanical attachments associated with oil-burner installation are occasioned by the necessity for safety from fire. From a mechanical standpoint, there is no such thing as making a burner too automatic, except as this accomplishment might be brought about at the expense of additional mechanical details.

Question 3. What is your opinion of the safety and mechanical perfection of present-day oil burners?

Answer: There is no question about the safety of oil-burning devices of the present day, where the mechanical perfection has been carried to such a high point as reasonably may be expected from designs now on the market.

Question 4. How about the noisiness of oil burn-

ers and what is being done about it by the manufacturers?

Answer: The noise that an oil-burning device makes ought not to be a serious drawback because, in cases where this becomes a nuisance to the householder, it might be and generally is possible to isolate the place where the oil burner is located with sound-proof material or to adopt methods that will eliminate enough of the noise to relieve the household from having the device get on its nerves. The past year has seen great developments in the reduction of noise and vibration in the oil burner, and this objection is much less pronounced now than it was a few years ago.

Question 5. What is the general trend of design as revealed by the new models of oil burners?

Answer: The general trend is toward simplification and the use of thermostatic devices which are not necessarily a part of the oil burner but which add materially to its satisfactory operation. Mechanical details of the newer burners assure practically continuous and reliable operation under the various more or less changing conditions that are found in every domestic installation. Like all new mechanical inventions, earlier developments are the most complicated. The burner of the future should be so simplified that it can no longer be called complicated. This probably is the goal towards which oil-burner designers are working.

Question 6. Originally oil burners were designed for the use of light oils. Later types were adapted for heavier oils of 28-32° A.P.I. How do light and heavy oils compare in favor at the present time and what is the trend in this connection?

Answer: In the oil field generally, the tendency is towards the use of heavier oils because they are cheaper. The whole question of whether to use light or heavy oils turns on the matter of price because there is no doubt that oil burners can be designed properly for the use of both.

Question 7. The possibility has been suggested of installing oil burners on the attic floors of dwellings, leaving the cellars available for living space. This practice has been criticized on the ground that too much noise and vibration might result. Do you consider this arrangement feasible?

Answer: I do not think much of the idea of installing an oil burner above the cellar floor. Personally, I should much prefer to use the third floor for living space, rather than the cellar; also, I believe that the vibration and noise would be communicated more readily throughout the house if the burner were on the third floor, instead of in the cellar, because a foundation readily could be built in the cellar, independent of the structural part of the house, to eliminate vibration.

Question 8. Another suggestion is that instead of burning oil directly in a burner it might first be used in the home to generate gas and the gas utilized in the heating plant. Is this idea practicable or desirable?

Answer: There is no question but that the burning of gas for the generation of heat is the most ideal arrangement. If a process for gasifying oil independently of the burner could be accomplished cheaply and successfully, it would be decidedly worth the effort.

Question 9. On what basis should the merits of an oil burner be judged? How are present oil burners meeting these requirements?

Answer: The merits of an oil burner so designed as to insure practically complete combustion should depend almost entirely on the item of service. No oil burner should be installed by anyone where service conditions are likely to be interrupted or unobtainable on short notice. The average householder is in no position to cope with a serious stoppage in oil-burner operation over any length of time, which might even be measured in minutes, particularly if such occurrences happened in extremely cold weather. Therefore, to every householder, at least, the question of service should be looked upon as a controlling factor in reaching a decision regarding the installation of a burner.

Canada Becoming Independent of the United States for Its Fuel Supply

SINCE 1923 the Dominion Fuel Board has been working on a program of finding fuels to replace United States anthracite for domestic purposes and of demonstrating the efficiency with which such fuels can be used. The Second Progress Report of the Board, issued recently, states that the imports of United States anthracite into Ontario and Quebec not only have been reduced from 4.75 million tons in 1923, to 3.07 million tons in 1927, but the proportion of United States anthracite used in these provinces for domestic purposes has fallen from 87% in 1923, to 61% in 1926, and this proportion probably will be less in 1927.

Alberta coals available in Ontario, as yet only in experimental quantities, have been accepted by many consumers as a suitable fuel. The production of by-product coke as a domestic fuel, the introduction into Canada of British anthracite, and the utilization of low volatile semi-bituminous coals for domestic heating are new sources of supply, which, in 1927, in Ontario and Quebec, provided the equivalent of 1,500,000 tons of American anthracite.

The use of coke for domestic heating in Ontario and Quebec has increased 200% since 1923. Appreciation of this fuel by the public is rapidly increasing, and it is the opinion of the Fuel Board that coke eventually will be the fuel most extensively used to replace anthracite.

Canada contains over 37,000 sq. mi. of peat bogs, and the possibilities of utilizing this fuel were investigated by a joint committee of the Dominion and Ontario governments. The conclusion reached was that although peat cannot be placed in the

same class as anthracite for heating in the winter months, it nevertheless can be used to advantage as an auxiliary fuel and makes a satisfactory fuel for domestic furnaces in the spring and autumn.

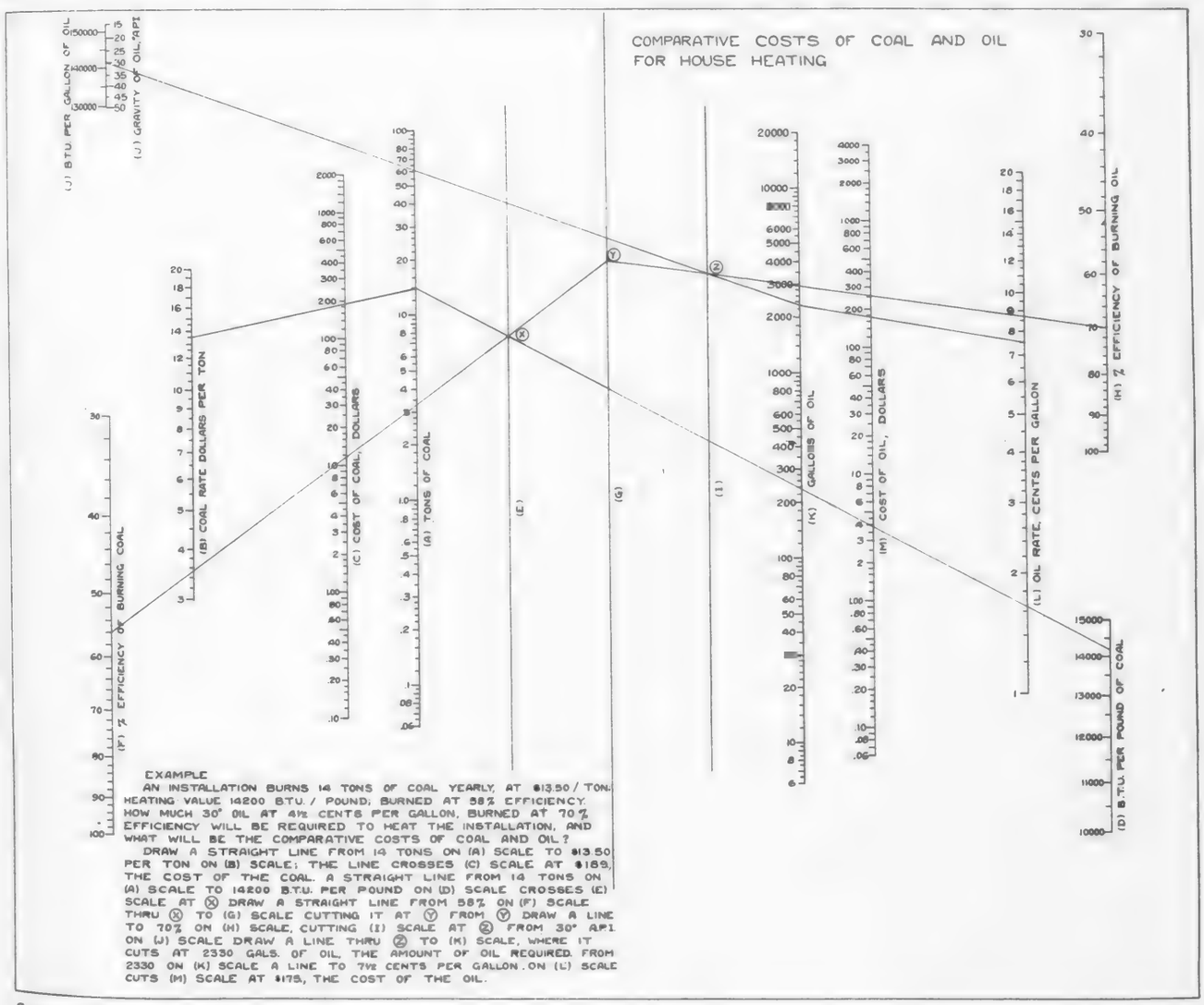
As a fuel for both domestic and industrial purposes, crude oil has developed into quite an important factor in the general fuel situation. In the coast cities of British Columbia, imported oil has been for some years a strong competitor with coal. More recently fuel oil has come into prominence as an industrial and domestic fuel in other parts of Canada. Fuel oil used for domestic purposes only in Ontario and Quebec showed a total distribution of 28,000,000 gal., which would displace approximately 200,000 tons of coal. Manufactured gas is another fuel which is being used in increasing amounts for house-heating in Canada. During 1927, Ontario and Quebec reported a total of 10,250,000 thousand cu. ft. of manufactured gas used for domestic purposes, a quantity sufficient to displace about 205,000 tons of coal.

Although electricity is economically used for industrial and transportation purposes, the Fuel Board is of the opinion that, except in an auxiliary capacity, electricity for house heating is not practicable on a large scale under present conditions. Extensive developments, however, may be anticipated in the utilization of the off peak load for the generation of steam and its storage in accumulators for use as required during the 24 hrs.

As a result of an investigation into the possibilities of central station heating, the Fuel Board concluded that the central heating of groups of institutional buildings and community heating of residential properties have shown the economies and benefits to be derived from these methods, and that such systems will be adopted profitably to an increasing extent.

Nomographic Chart for the Determination of Comparative Costs of Oil and Coal for House Heating

Charts for Comparative Costs of Oil and Gas and Gas and Coal were published in The Heating and Ventilating Magazine for March, Page 77.


COMPARATIVE COSTS OF COAL AND OIL FOR HOUSE HEATING
(J) B.T.U. PER GALLON OF OIL
(J) GRAVITY OF OIL-°API
(B) COAL RATE DOLLARS PER TON
(C) COST OF COAL, DOLLARS
(A) TONS OF COAL
(E)
(G)
(I)
(K) GALLONS OF OIL
(M) COST OF OIL, DOLLARS
(L) OIL RATE, CENTS PER GALLON
(H) % EFFICIENCY OF BURNING OIL
(F) % EFFICIENCY OF BURNING COAL
(D) B.T.U. PER POUND OF COAL
EXAMPLE
AN INSTALLATION BURNS 14 TONS OF COAL YEARLY, AT $13.50 / TON. HEATING VALUE 14200 B.T.U. / POUND; BURNED AT 58% EFFICIENCY. HOW MUCH 30° OIL AT 4½ CENTS PER GALLON, BURNED AT 70% EFFICIENCY WILL BE REQUIRED TO HEAT THE INSTALLATION, AND WHAT WILL BE THE COMPARATIVE COSTS OF COAL AND OIL?
DRAW A STRAIGHT LINE FROM 14 TONS ON (A) SCALE TO $13.50 PER TON ON (B) SCALE; THE LINE CROSSES (C) SCALE AT $189, THE COST OF THE COAL. A STRAIGHT LINE FROM 14 TONS ON (A) SCALE TO 14200 B.T.U. PER POUND ON (D) SCALE CROSSES (E) SCALE AT ⊗ DRAW A STRAIGHT LINE FROM 58% ON (F) SCALE THRU ⊗ TO (G) SCALE CUTTING IT AT Ⓨ FROM Ⓨ DRAW A LINE TO 70% ON (H) SCALE, CUTTING (I) SCALE AT Ⓩ FROM 30° API ON (J) SCALE DRAW A LINE THRU Ⓩ TO (K) SCALE, WHERE IT CUTS AT 2330 GALS. OF OIL, THE AMOUNT OF OIL REQUIRED. FROM 2330 ON (K) SCALE A LINE TO 7½ CENTS PER GALLON ON (L) SCALE CUTS (M) SCALE AT $175, THE COST OF THE OIL.

Courtesy of Pittsburgh Equitable Meter Company

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OF all the proposed legislation, either state or national, which has been aimed at the heating and ventilating industry, nothing quite equals, in its drastic provisions, a bill which has been introduced in the New York State Legislature under date of February 20 of this year. Briefly, the bill provides for a division of steam power and heating plants in the State Department of Labor, to be under the control of the Industrial Commission. Its duties would include the administration of a code to be drawn up by the Industrial Board, covering the installation, alteration and equipment of steam power and heating plants throughout the State. This code is to be applicable to plants now installed, to be installed in the future and to alterations to existing and future plants. Included in the code is to be a set of standard specifications prescribed by the Industrial Board for installing steam power and heating plants, including materials, workmanship and manner of executing such work.

Every heating contractor or, as the bill has it, "every employing or master steamfitter" carrying on his business in New York State must be registered—at a fee of $5.

With the stage thus set, the industrial commissioner would be empowered to appoint a corps of inspectors from the ranks of practical mechanics "who shall have served at least ten years as journeymen at the business." It would be within the province of these men not only to inspect the construction and alteration of steam power and heating plants and of existing plants already installed, but to keep track of those firms engaged in steam power and heating work who have not registered. All plans and specifications for the installation and operation of steam power or heating plants would, of necessity, be submitted to the industrial commissioner for approval—accompanied by a fee of $10. No steam power or heating plant could be installed or altered unless the plans had been duly approved; in fact, this approval would be required irrespective of any approval by the local superintendent of buildings. Furthermore, no steam power or heating plant hereafter installed could be operated unless such plant had been approved by the industrial commissioner.

Naturally, the bill has aroused all the interests affected, including real estate operators, insurance companies, building trades, heating and piping contractors and heating and ventilating engineers. To cite only the major objections that can be raised to the measure, it is easy to see how such a law would add materially to the cost of doing business, not the least item being construction delays caused by the time required for filing plans. It would interfere seriously with the work of licensed engineers, while the penalty for failure to have registration cards on the job is drastic. One can imagine the hardships which might ensue in the case of emergency repairs, when the office of the Department of Labor was closed. Still another complication would be the construction difficulties that would follow in case of change of plans. Such a law would add to the cost due to filing and other fees, would impose an unnecessary hazard in revocation proceedings, to say nothing of the delays due to possible controversies.

It simply is inconceivable that such a bill can receive serious attention from the State legislature, yet the mere fact that it could be introduced, referred to the Committee on Labor and Industries and brought up for a hearing, indicates the trend of thought of those who would like nothing better than to exploit the industry in the manner stated.

IF any doubt existed as to the futility of compiling two different codes for the testing of low-pressure boilers, it is dispelled by the presentation, in this issue, of a comparative analysis of the codes adopted by the National Boiler and Radiator Manufacturers' Association and by the American Society of Heating and Ventilating Engineers. As is brought out very clearly in the analysis, the points of divergence are far from being important. In fact, the conclusion is almost inevitable that the whole matter turns on the question, shall the accepted code be known as that of the N.B. & R.M.A. or that of the A.S.H. & V.E?

We believe there are enough broad-gauge men in both organizations to effect a satisfactory solution of this *impasse*.

A Vision *for the* Oil-Burner Industry

Trell W. Yocum

Managing Director, American Oil Burner Association and Oil Heating Institute

AT the beginning of 1921, there were 12,500 oil burners in operation throughout the country. On January 1, 1929, there were approximately 422,000 oil burners in use in American homes. In eight years the oil-burner industry has increased 3500%!

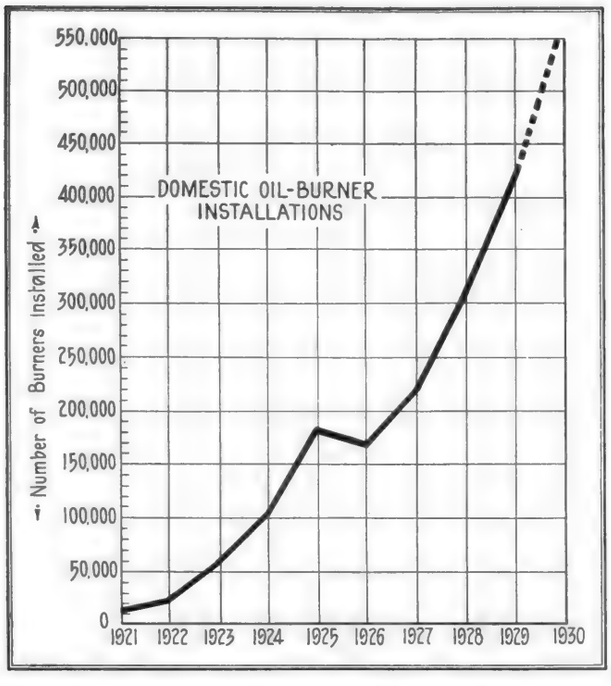
And it is no flight of optimism to say that the potential market has hardly been scratched. That market literally is shifting and enlarging with the passing of each day. Some indication of its size may be caught in the realization that the number of oil burners already installed represents only 2.7% of the 17,500,000 wired homes in the country.

The last few years have seen remarkable progress in mechanical design and manufacture—and with it increased sales activity by responsible manufacturers.

What of the outlook? It seems to me that prophecy in such a case is easy. The oil-burner industry is founded upon a fundamental urge of human nature that has inspired the whole span of human progress—the desire to make life more livable, more enjoyable, more productive. Automatic heating with oil—effortless, clean, as flexible as the change of weather—has taken a prominent place among the more recent advances of progress that have supplanted routine cares and drudgeries of life with new opportunities, new time, and new energy for *living*. The automatic oil burner has brought heating up to the same modern level of comfort we already have in other details of our homes. The lights we use, the modern bathroom, the telephone, the vacuum cleaner and washing machine are not essential for the mere maintenance of life. But, for a fuller and richer enjoyment of life, their convenience is indispensable.

Thus considered, the oil-burner industry cannot fail to progress. And the speed of that progress may be forecast on the basis of the tempo it already has established.

Past Year's Progress in the Oil-Burner Industry Presages Bright Future



The Outlook for the Oil Burner Seems to Indicate a Continuation of the Present Rate of Increase in Demand

ADOPTION of a code to eliminate mis-statements and harmful statements in advertising, tentative approval of the association standards for fuel and furnace-oil by the Department of Commerce, an oil-burner exhibition in one of the country's largest department stores, the birth of a new magazine to serve the industry, a report reflecting the interest of public utilities in the oil burner, appointment of a new leader for the association, important mergers of manufacturers, increased sales ranging from 10% to 20% above those in 1927, and the development of numerous new burners and accessories —all mark the steady progress of the oil-burner industry during the past year toward increased stabilization, higher commercial ideals and increased production.

It is not possible, in a magazine devoted to heating and ventilating in general, to review completely the activities of an industry as large as that engaged in the manufacture and distribution of oil burners. However, a brief discussion of the important steps in the advance of the industry since last year's convention of the American Oil Burner Association will indicate the significance of the past year's activities.

In the past, THE HEATING AND VENTILATING MAGAZINE has been particularly active in carrying on a campaign of constructive criticism of the advertising methods used by many of the oil-burner manufacturers and their dealers. The need for an advertising code in the industry to establish a standard has been recognized for some time, both by members of the American Oil Burner Association as well as by those not actively engaged in the oil-burner field. Adoption of the code for oil-burner advertising by the association at the October meeting, therefore, was of particular importance.

Extravagant generalities and claim of efficiencies in comparison with other makes of burners are not to be used, according to the new code. Disparaging statements about the design of a competing device is poor practice, and the use of elaborate pseudo-scientific language is to be avoided, as it tends to confuse the public mind and create the belief that the burning of oil is a mysterious and complicated process. In the code, particular attention has been paid to statements as to price and approval by the Underwriters' Laboratories. The preparation of this code was in the hands of a committee of which Haldeman Finnie was chairman, and the drafting and subsequent adoption of the code represents a particularly worthwhile accomplishment.

Last April, after working on this problem in cooperation with the Underwriters' Laboratories, the American Petroleum Institute and the American Society of Testing Materials, the association adopted uniform standards for furnace and fuel-oil. In the early part of 1929, these standards were approved, with certain minor changes, by a conference called at the request of the Bureau of Standards. If the standards are accepted by 65% of the refiners—and it is reasonable to expect they will be—they will become the official Department of Commerce standards for domestic and industrial fuel-oils.

At John Wanamaker's, New York, last fall, an oil-burner exposition was staged by twelve manufacturers. The exposition was the result of cooperative arrangement between the Oil Heating Institute and the house-furnishings department of the store. It was notable in that it revealed the desire of the store to give complete service to their customers in automatic house heating and reflected a demand on the part of the public to learn more about oil heating.

November witnessed the advent of the monthly magazine, *Oil Heat*, which is serving the industry by keeping dealers and manufacturers informed of the latest developments in domestic and industrial oil burning, not only in this country but in foreign parts as well. Originally sponsored by THE HEATING AND VENTILATING MAGAZINE, *Oil Heat* undoubtedly has a bright future under the capable direction of its new owner and editor, P. E. Fansler.

When the directors of the American Oil Burner Association and the Oil Heating Institute chose Trell W. Yocum as managing director last year, they chose wisely and well. Mr. Yocum, who formerly was director of the public relations division of the American Petroleum Institute, came well fitted for his post. Under his direction, the Oil Heating Institute has been incorporated, and the institute's publicity given a wider circulation by three million copies of its promotion material over the previous figure. The industry can rightfully expect great achievements by the association and institute, under his direction.

The National Electric Light Association, an organization whose membership consists of the greater part of the electric light and power companies in this country, recently made public its report on the oil-burner industry. Recognizing the importance of oil heating, the N.E.L.A. report was based on a seven months' study, with special attention given to the merchandising possibilities of oil burners and to the electric load resulting from the operation of oil burners. The report revealed that several power companies either are selling or recommending oil burners, and it is to be hoped that the utilities will consider it to their interest to cooperate with burner manufacturers, dealers, and their associations, further to promote the popularity and use of the oil burner.

A survey completed by the Oil Heating Institute shows that the number of domestic oil-burner installations as of January 1, 1929, was 422,700 as against 304,200 for January 1, 1928—an increase of 39%. Oil-burner and accessory manufacturers report sales increases for 1928 over 1927, ranging from 10% to 250%, and several reported during March that they were behind with shipments, although some of them are operating their plants day and night. These reports indicate a healthy condition in the industry.

New burners show an ever-increasing tendency on the part of established companies not to change the essential design of the burner, but rather to improve the details and adopt new accessories. In this respect, oil-burner practice somewhat parallels that of the motor-car industry, where changes in design, are, in general, those of refinement rather than of principle. Particular mention can be made of the increasing number of small or junior-size burners introduced to appeal to the owners of small houses who cannot afford the larger, more elaborate and more expensive burners.

Public confidence is growing, and ever-increased interest is being taken in this fifty-million-dollar industry by heating contractors, architects, builders and dealers, and the future looks brighter than ever before.

Arrangements Completed for American Oil Burner Association Convention, Hotel Pennsylvania, New York, April 9-11

Monday, April 8

9 A.M. to 5 P.M.	Registration.
9 A.M. to Noon.	Committee meetings.
2 P.M.	Meeting of Board of Directors.

Tuesday, April 9

9:00 A.M.	Exhibit hall opens.
9:30 A.M.	Meeting of Board of Directors.
9:30 A.M.	Committee meetings.
10:00 A.M.	Meeting of Board of Governors—Dealer Div.
1:30 P.M.	General session in small ballroom.
1:30 P.M.	Opening address—J. C. Johnson, president, American Oil Burner Association.
2:00 P.M.	"The Oil Industries' View of Oil Heating," W. R. Boyd, Jr., executive vice-president, American Petroleum Institute.
2:30 P.M.	"What the Oil Burner Means to the Electrical Industry," Matthew S. Sloan, president, Brooklyn Edison Company.
3:00 P.M.	"The Value of Industrial Cooperation," Alfred Reeves, general manager, National Automobile Chamber of Commerce.
3:30 P.M.	Address, Thornton Lewis, president, American Society of Heating and Ventilating Engineers.
4:00 P.M.	"Service Underwriters' Laboratories Render Industries," A. R. Small, vice-president, Underwriters' Laboratories.
4:30 P.M.	Annual business meeting (members only) small ballroom.
6:30 P.M.	Annual banquet, grand ball room. Toastmaster, Edward P. Bailey, chairman of the board, American Oil Burner Association. Speaker: Captain Irving O'Hay, U.S.A.
10:00 P.M.	Dancing, grand ball room.

Wednesday, April 10

9:00 A.M.	Exhibit hall opens—registration.
9:30 A.M.	Meeting of new Board of Directors—exhibit room No. 6.

Engineering Session

9:30 A.M.	Group session—engineering. Exhibit room No. 3.
9:30 A.M.	Address, Chairman H. S. Rogers, vice-president, Combustion Fuel Oil Burner Company.
9:45 A.M.	"The Application of Electricity to the Domestic Oil Burner," Elliott Harrington, industrial engineer, General Electric Company.
10:15 A.M.	"Relation between Draft and Burner Operation," J. L. Breese, Jr., president, Breese Engineering Corporation.
11:15 A.M.	"Controlling Oil Burners Automatically by Outdoor Temperature," F. I. Raymond, president, F. I. Raymond Company.
11:45 A.M.	"Design of Oil-Burning Boilers," Henry Downs, sales manager, Combination Boiler Company.

Sales Session

9:30 A.M.	Group session—sales, small ballroom.
9:30 A.M.	Address, Chairman W. A. Kemp, director of sales, Hardinge Brothers, Inc.
9:45 A.M.	"Oil-Burner Prospects for 1929," M. E. Simpson, vice-president, Electrol, Inc.
10:15 A.M.	"Retail Sales," T. C. Kyle, general sales manager, Winslow Boiler and Engineering Company.
10:45 A.M.	"The Value of Analysis," E. V. Walsh, general sales manager, Timken-Detroit Company.
11:45 A.M.	"This Business of Selling," Borden and Busse, New York University.

Manufacturers' Session

1:30 P.M.	Group session—manufacturers, small ballroom.
1:30 P.M.	Address, Chairman H. Finnie, vice-president and general manager, Timken-Detroit Company.
1:45 P.M.	"Selecting Space and Copy to Meet Your Advertising Needs," Howard W. Dickinson.
2:15 P.M.	"How to Market Oil Burners," Lawrence Smith, general sales manager, Petroleum Heat and Power Company.
2:45 P.M.	"Selling on Time Payments," C. Y. Palitz, president, Credit Allowance Corporation.

3:15 P.M. "Development of Oil Heating in Europe," I. Lubbock, chief engineer, fuel oil department, Shell-Mex, Ltd., London.
3:45 P.M. "Opportunities for the Oil-Burner Industry in Connection with Warm-Air Heating," L. Wayne Arny, advertising and publicity manager, Richardson & Boynton, former director of publicity, National Warm Air Heating Association.
4:15 P.M. "Viewpoint Manufacturers Should Have Toward Dealer Costs," W. P. Mackenzie, president, W. P. Mackenzie Company.

Dealers' Session

1:30 P.M. Group session—dealers, exhibit room No. 3.
1:30 P.M. Address, Chairman Charles Bendix, president, Oil Heating Association of Long Island.
1:45 P.M. "The Value of Accounting," L. D. Angell, Electrol Distributing Corporation.
2:15 P.M. "The Problem of Seasonal Sales," L. A. Welch, general sales manager, Silent Automatic Corp.
2:45 P.M. "Dealer Organization," J. S. Kaplan, vice-president, Preferred Utilities Company.
3:15 P.M. "The Advantages of Time Payments," K. B. Lewis, president, Commercial Credit Corporation.
8:00 P.M. New York night—entertainment (see entertainment program).

Thursday, April 11

9:00 A.M. Exhibit hall open—registration.
9:30 A.M. Meeting of new Board of Directors, exhibit room No. 6.
9:30 A.M. Meeting of new Board of Governors, Dealer Division. Exhibit room No. 5.

Advertising Session

9:30 A.M. Group session—Advertising, exhibit room No. 3.
9:30 A.M. Address, Chairman E. Earl Newsom, assistant director, Oil Heating Institute.
9:45 A.M. "Why We Advertise," O. D. Street, vice-president, Lord and Thomas and Logan.
10:15 A.M. "How to Use Direct Mail Material," Edwin S. Jefferies, Lyddon, Hanford and Kimball.
10:45 A.M. "The Use of Newspapers for Advertising," Fred S. Hale, advertising department, New York Evening Journal.
11:15 A.M. "How to Tie in with National Advertising," E. Earl Newsom.

Dealer Problems Session

9:30 A.M. Group session—dealer problems, small ballroom.
9:30 A.M. Address, Chairman W. J. Harter, director of school, Electrol Inc.
9:45 A.M. "How to Make Service Profitable," L. L. Halle, May Westchester Oil Burner Corporation.
10:15 A.M. "Retail Sales Problems," John Macintyre, president, Austin Electric Supply Company.
10:45 A.M. "The Dealer's Engineering Problems," H. H. Lorenz, chief engineer, International Burners Corporation.
11:15 A.M. "The Value of Local Associations," W. J. Harter.
2:30 P.M. Meeting of counsellors, Oil Heating Institute, directors room, 342 Madison Avenue.
2:30 P.M. Joint conference—burner and control manufacturers re: Underwriters' Laboratories, standards for listing, small ballroom.
11:00 P.M. Exhibit hall and convention closes.

List of Exhibits

53 54 55 **American Nokol Corp., Chicago.** Models L, N, R, and G oil burners.

31 32 **American Radiator Co., New York.** Entire line of Mercoid controls for oil burners; Arco solenoid valve; water cut-out and pressure control; thermostats.

38 39 **Automatic Burner Corp., Chicago.** ABC types E and H oil burners and demonstration of atomizer.

66 **Baker Oil Burners, Inc., Denver, Colo.**

10 **Bettendorf Oil Burner Co., Bettendorf, Ia.**

58 59 **Bryan Steam Corp., Peru, Ind.** Six sizes of the Bryan oil-burning boiler.

60 **Bunting Iron Works, Berkeley, Calif.** Simplex automatic oil burners and Simplex turbine oil burner.

70 71 **Cleveland Steel Products Corp., Cleveland, O.** Torridheet oil burners.

64 **Combination Boiler Co., Inc., Benton Harbor, Mich.** New model oil-burning boiler.

45 **Combustion Fuel Oil Burner Co., Milwaukee, Wis.** Types B-5 and B-20 Silent Combustion oil burners.

52 **Cook Electric Co., Chicago, Ill.** Automatic pumps, gauges, anti-syphon valves, oil-burner controllers, hot water regulators.

61 **Cooper Hewitt Electric Co., Hoboken, N. J.** Mercury bulb Kon-nec-tors adapted to controls.

7 **Dongan Electric Mfg. Co., Detroit, Mich.** Ignition transformers.

1743 **Draft-A-Justor Corp., Chicago, Ill.**

28 29 **Electrol, Inc. of Missouri, St. Louis, Mo.** Electrol oil burners.

36 **Enterprise Oil Burner Co., San Francisco, Calif.** High and low-pressure industrial oil burners; worm-drive pump set; steam specialties.

1 2 **Fuel Oil & Temperature Journal, New York.** Magazines.

1731 **General Electric Co., Schenectady, N. Y.**

42 43 **Hardinge Brothers, Inc., Chicago, Ill.** Models 9 and 10 Hardinge oil burners and a working demonstrator.

11 **The Heating and Ventilating Magazine, New York.** Magazines and books.

30 **Holby Burner Corp., New York.** Type A domestic oil burner and types B and C industrial oil burners.

67 **International Boiler Co., Stroudsburg, Pa.** Triple service boiler.

47 48 **International Burners Corp., New York.** Caloroil, Crescent and Victory oil burners.

1745 **Janette Mfg. Co., Chicago.** Oil pumps, blowers, rotary converters, motors and oil strainers.

8 9 **S. T. Johnson Co., Oakland, Calif.** Johnson oil burners.

37 **King-Seeley Corp., Ann Arbor, Mich.** Telegage.

46 **Lassen & Bissell, Inc., Hartford, Conn.**

1739 **Malleable Iron Fittings Co., Branford, Conn.** Branford oil burners and parts.

63 **Marr Oil Heat Machine Corp., Minneapolis, Minn.** Models H, G, and E oil burners.

40 41 **May Oil Burner Corp., Baltimore, Md.** Silent May oil burners.

57 **McIlvaine Burner Corp., Evanston, Ill.** Oil burners and improved automatic flame controller.

3 4 **Mercoid Corp., Chicago, Ill.** Mercoid controls.

24 25 26 **Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.** Thermostats, limit controls, Protectorelays and motor switches.

22 23 **Nu-Way Corp., Rock Island, Ill.** Oil burners.

11 **Oil Heat, New York.** Magazines.

1733 **The William H. Pascoe Co., Chicago, Ill.**

12 to 15 **Petroleum Heat & Power Co., New York.** Petro oil burners.

1742 **Petrometer Corp., Long Island City, N. Y.** Type F Petrometer distant reading tank gauge.

5 6 **Preferred Oil Burners, Inc., Peoria, Ill.** Hart oil burners.

49 **Preferred Utilities Mfg. Corp., New York.**

1741 **Progressive Machinery Co., Minneapolis, Minn.** Model A900 Progressive oil burner and Type G, Model 4 electric oil burner.

62 **Quaker Mfg. Co., Chicago, Ill.**

65 72 **W. S. Ray Mfg. Co., San Francisco, Calif.**

1746 **Reif-Rexoil Co., Buffalo, N. Y.** Type D oil burner.

1738 **Refractory and Engineering Corp., New York.**

1736 **Rickard Engineering Corp., Brooklyn, N. Y.** Type B3 large-sized oil burner and type A2 oil burner.

27 **Security Stove & Mfg. Co., Kansas City, Mo.**

17 18 **Silent Automatic Corp., Detroit, Mich.** Silent Automatic oil burners.

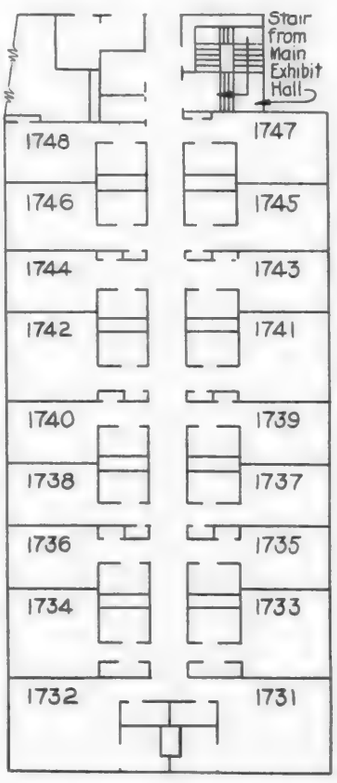
1748 **Silent Glow Oil Burner Co., Hartford, Conn.** Silent Glow oil burners.

50 51 **Super Oil Heator Mfg. Co., Pawtucket, R. I.** Super Oil Heator.

1744 **Sword & Kimber Co., Philadelphia, Pa.**

44 **Tabor Mfg. Co., Philadelphia, Pa.** Type D, Nos. 1 and 2 oil burners.

68 **Taco Heaters, Inc., New York.** Jacketed Super-Taco, Taco Abbott system, domestic Taco water heater and Taco panel.



21 **Teesdale Mfg. Co., Grand Rapids, Mich.** Type TU automatic pump for burners using pressure atomization and type R automatic pump.

33 34 35 **Time-O-Stat Controls Co., Elkhart, Ind.** Room Thermoswitch, control systems, limit controls, magnetic valves, Stackswitch, electric control motors and mercury switches.

56 **Timken-Detroit Co., Detroit, Mich.** Timken rotary oil burner and all-electric model oil burner.

16 **Titeflex Metal Hose Co., Newark, N. J.** Titeflex all metal tubing.

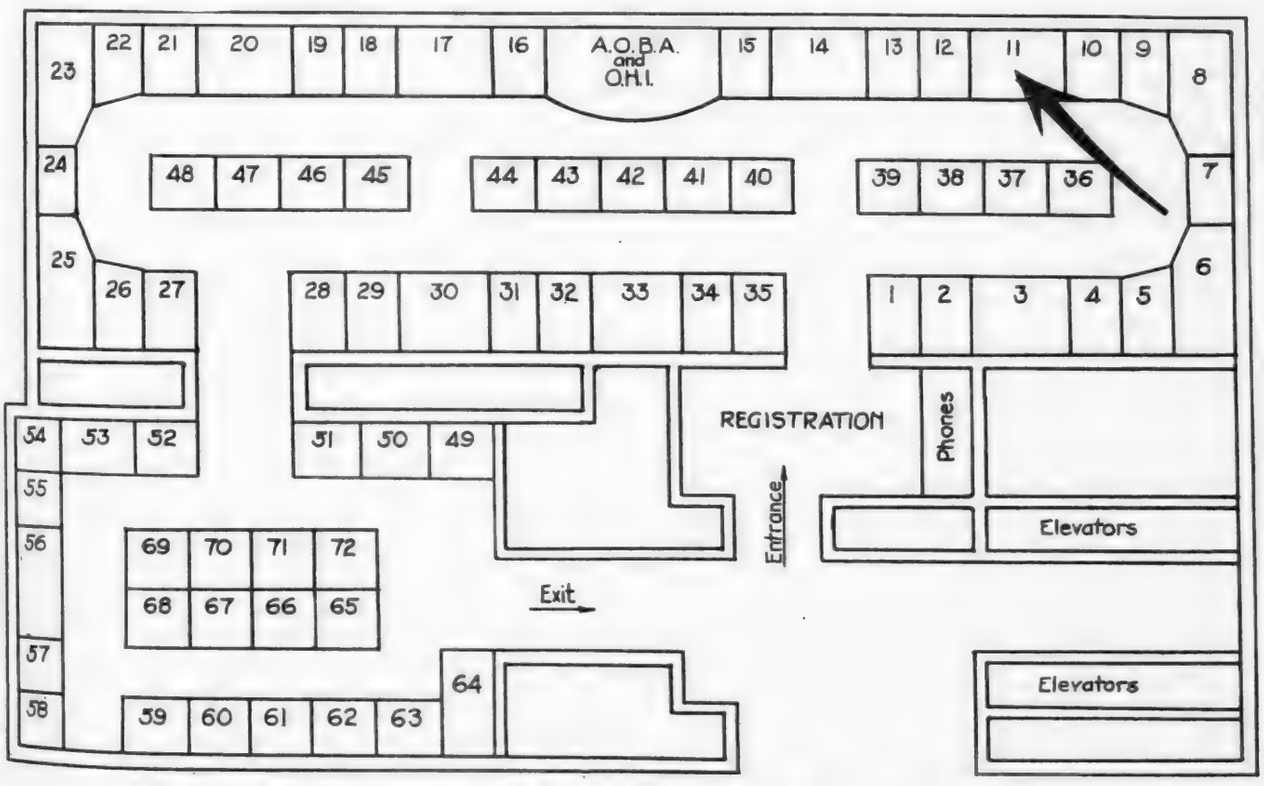
19 **Tuthill Pump Co., Chicago.** 1929 model oil pumps in part and in sub-assemblies.

1735 **Wayne Home Equipment Co., Fort Wayne, Ind.** Types D3 and D4 oil burners and electric refrigerator.

20 **Webster Electric Co., Racine, Wis.** Ignition transformers and Universal filters.

1747 **Westinghouse Electric Co., East Pittsburgh, Pa.**

1740 69 **Winslow Boiler and Engineering Co., Chicago.** Kleen-Heet oil burners.

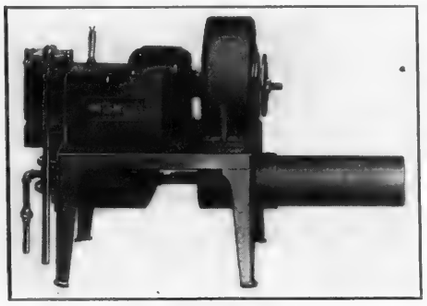


Plans of Exhibit Spaces at the Sixth Annual Convention of the American Oil Burner Association. Arrow Indicates Location of Exhibit of The Heating and Ventilating Magazine

Development of Junior Sizes Features New Oil-Burner Equipment

American Nokol Corporation

During the past year Nokol announced the addition of a new open flame type, electrically-ignited oil burner to its line

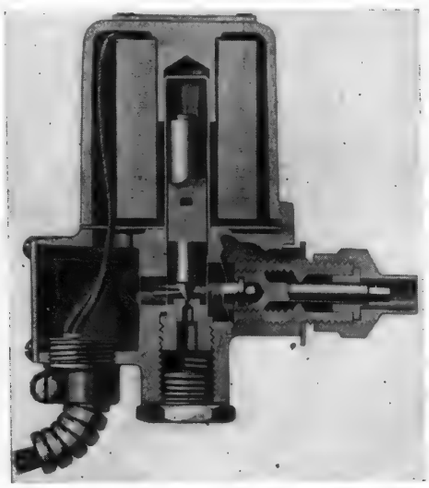


Model G Nokol

of Nokol and Aetna burners. This burner is made in two sizes, G and G-2, to burn from 1 to 9 gal. of oil per hr. Electric ignition is proved by Webster transformers and Nokol electrodes. Low-pressure air is supplied by special fans, and the oil is atomized by means of Nokol nozzles which can be changed whenever desired. The control system includes an oil regulating device, which governs nozzle pressure and returns surplus oil to the tank. Fuel oil of less than 28° gravity can be used in this burner.

American Radiator Company

One of the outstanding achievements in the oil-burner accessory field was the development of the No. 682 Arco solenoid valve. This valve is designed for use in connection with the oil supply or the gas pilot and can be operated by any mercoid temperature or pressure control or controlled manually by hand switch. Failure of current causes the valve to close and will operate under an oil pressure as high as 50 lbs.

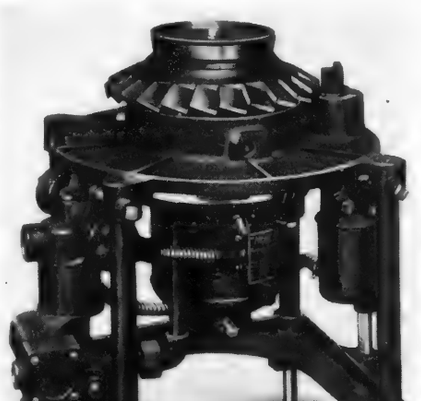


No. 682 Arco Solenoid Valve

Automatic Burner Corporation

The A B C type H oil burner, announced last fall by this company, is a low-priced rotary ash-pit burner. It is made for installations of 899 sq. ft. of steam radiation or less, and is fully automatic. The frame has adjustable legs, and the motor is a 1/20 H.P. for either A.C. or D.C. The motor is suspended from the frame by four flat springs which prevent transmission of vibration. The magnetic oil valve is of special design, with the junction box combined with this unit so that wiring connections are simplified. Ignition can be furnished either by gas or electricity. Bowl diameters range from 12 in. to 20 in. in diameter. This burner can be installed at a price ranging from $375 to $395, including a profit to the dealer.

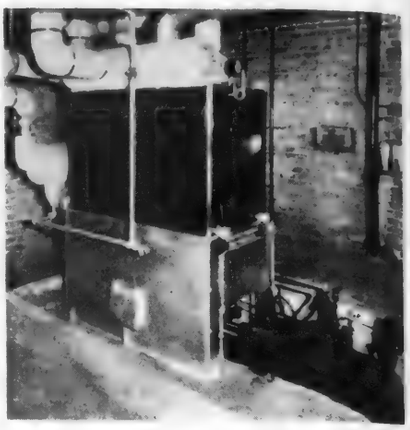
Business up to March 1, 1929, for this company has been over three times greater than that for the same period during 1928.



A B C Heat King

Baker Oil Burners, Inc.

The general offices and equipment of this company were moved from Pueblo, Colo., to the factory of the General Iron Works, Denver, Colo. New capital was added to the company, a new merchandising policy has been provided for, and the company will soon begin an aggressive nation-wide sales campaign.



Bryan Oil-Burning Boiler

Bryan Steam Corporation

The number of sizes in which Bryan oil-burning boilers is made has been increased to six, with capacities ranging from 350 sq. ft. to 3600 sq. ft. of steam radiation. The domestic water coil has been relocated on this line of boilers and is now placed in the boiler dome, and several other changes were made in the design and appearance of the boiler. Each of the sizes will be finished in a standard color in enamel.

Bryant Engineering Corporation

The Sav-Oil warm air heater, designed to burn oil, was developed by this company during 1928. This furnace, which weighs about 800 lbs., is made of welded steel plates, and has no gaskets or openings. Either gravity or forced flow can be used. A humidifier is included, and this device can be set for different rates of evaporation, thus overcoming one of the chief disadvantages of warm-air heating.

Bunting Iron Works

The Simplex automatic oil burner, made by this company, is equipped with a nozzle giving a cone-shaped flame, the nozzle being of high-pressure type. An intermittent spark is provided through a Mercoid type SDP control, and combustion control is furnished by a Mercoid Visaflame or Stackstat. By means of a diaphragm mechanism operated by boiler pressure, the necessary air for combustion is regulated by the variation in steam pressure. This burner will operate with fuel oil of 28° Baume or lighter, and the standard size, No. 8, will carry from 300 to 2500 sq. ft. of steam radiation.

Chalmers Oil Burner Company

A domestic oil burner, Model C, was announced by this company in the past year. This burner is of the mechanical draft electrically-ignited, gun type. Nozzles of different sizes are provided so that the burner can be set to burn from 1 to 8 gal. of oil per hr. Minneapolis controls are used throughout, with the exception of the Chalmers stack control. A Janette repulsion induction motor drives the burner fan and the Tuthill pump.

Cleveland Steel Products Corporation

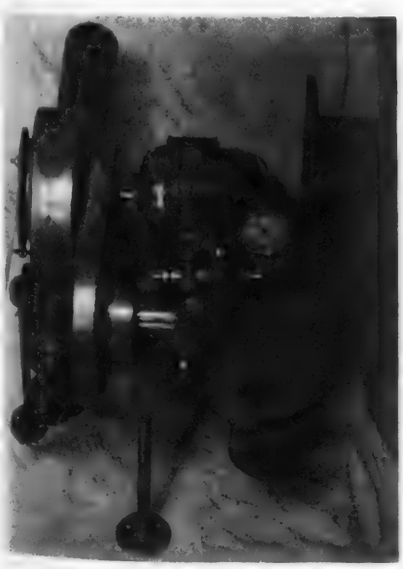
This company, manufacturer of the Torridheet oil burner, announced the addition of a junior burner during the past year, and states that it is building from 100 to 150 burners per day to keep up with orders.

Combination Boiler Company, Inc.

A new model oil-burning boiler, details of which are not available at the time of going to press, is announced by this company.

Combustion Fuel Oil Burner Company

Designed to meet the demand for a quiet and medium-priced burner, the type B Silent Combustion oil burner was announced last fall. The motor is lubricated by wool packing. The pressure pump operates at low speed and electric ignition is used for the burner. Fuel recommended by the manufacturer is 28° to 30° or higher. The capacity of this burner is up to 1500 sq. ft. of steam radiation. Standard Con-Tac-Tor or Minneapolis automatic controls are used.



Combustion Burner Type B-5

Cook Electric Company

A bellows-type fuel oil pump which is capable of maintaining a high vacuum has been produced in the type H, Junior model oil pump.

Dongan Electric Mfg. Company

A complete new line of ignition transformers with standard fittings, and equipped with conveniently located outlets for primary connections, was developed by this company during the past year.

Enterprise Oil Burner Company

Among the achievements for the past year for this company was the development of the worm-drive pump set, recently announced. An increase of 250% for sales of 1928 over 1927, are claimed by this manufacturer.

General Electric Company

Two months ago General Electric announced a new oil-immersed switch for throwing small alternating or direct current motors across the line. It consists of a one-piece cast-iron tank for oil, a cast-iron cover and a switch mechanism attached to the cover. Contacts are of silver-to-silver, double-break type. Use of these contacts eliminates shunts. The device is known as number CR-2960-SY-105.

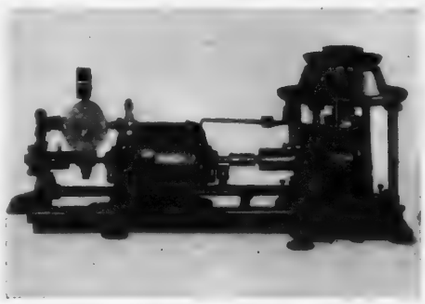
Grant Home Heater Corporation

A low-priced pot-type oil burner was recently developed by this company. This device consists of two oil pumps built in the unit and connected by a flexible spring coupling to a 1/12 H.P. motor. The motor also operates a Sirocco fan. The entire motor-driven unit is mounted on the under side of an oil sump that, with a running level of 1⅜ in., contains 1 gal. of oil. Inside the furnace, a cast-iron pot is connected through a magnetic valve to the oil sump. Ignition is by means of an oil pilot consisting of six pieces of absorbent refractory material loosely placed around the central portion of the pot.

Hardinge Brothers, Inc.

A new junior burner, Model 10, advertised to sell at $385 installed without tank, was brought out by this company within the past year. This machine consists of the essentials of the Hardinge burner, Model O, the head assembly, motor and straightdrive shaft. The burner is made in four sizes with atomizers ranging from 2¾ in. to 4 in.

The oil valve is assembled with the machine, and the gas control equipment



Hardinge Model 10

is mounted with the Con-Tac-Tor Lockswitch on a wall panel. The stack control, which is furnished with the burner, is installed in the stack and connected with the Lockswitch. Also a Con-Tac-Tor No. 135 Thermoswitch is furnished with each machine. This burner is designed to use 32°-34° gravity oil, with capacities from 350 to 2000 sq. ft. of steam radiation.

Hays Corporation

The Model C combustion meter, for recording and indicating CO_2 in connection with flue gas temperature and draft was announced by this company in 1928. The Orsat method of gas analysis is used in this device. Suspended pens, a 10-in. circular chart, and a new silhouette-type aluminum chart base with polished aluminum door are among the features of this meter. A draft attachment to the meter is actuated by a slack leather diaphragm which gives a pen movement of 2½ in. with a draft of 0.2 in. water column.

Improvements have also been made on the test sets made by this company.

Holby Burner Corporation

During the past year this company has perfected the Type C oil burner designed for moderate-sized commercial installations. This burner will operate on 18° oil.

International Burners Corporation

The name of the Caloroil Burner Corporation was changed some months ago to the International Burners Corporation, which will manufacture and market a complete line of oil burners of varying types and designs, among them the Crescent and Victory oil burners.

Janette Mfg. Company

A new Monroe automatic oil pump, type TRU, with a rotary pump action replacing the former piston action unit, was designed and developed within the last year. This pump has a capacity of 30 gal. of oil per hr. on a 10-ft. lift and a 100-ft. horizontal run. The unit is driven by a 1/20 H.P. motor, and equipped with a one-piece tank. Of the

carbon-to-carbon type, the switch has a recycling button which makes starting the pump merely a matter of pushing the button.

S. T. Johnson Company

A new factory branch and sales display room was recently opened by this company in the downtown section of Oakland, Calif.

Laco Gas Burner Company

A new plant was erected at Griswold, Iowa, last summer by this company, the total floor space being 12,000 sq. ft. A new warehouse and foundry was erected shortly after, and the company now has a capacity of 25,000 burners per year.

McIlvaine Burner Corporation

An improvement announced by this company is in the flame regulator motor, redesigned to operate more quietly then before, and made of die-cast parts.

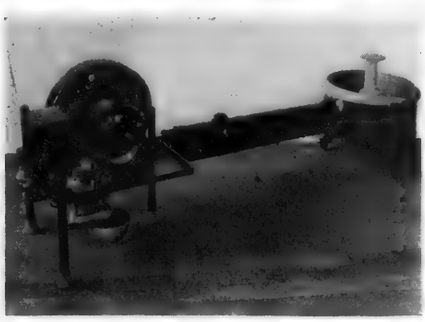
May Oil Burner Corporation

An unusual profit-sharing plan for the dealers of this company was announced in February. Any Quiet May dealer, who shall qualify for participation in this profit-sharing plan, shall be entitled to subscribe to one share of the common stock in the May Oil Burner Corporation for each May oil burner used and sold during the calendar year of 1928. At the end of each three-year period, dealers who complete their participation will receive a pro rata share of stock in addition to any cash dividends and accrued interest, rights or stock dividends that may have accrued during this period. This plan marks an unusual step in the merchandising of oil burners.

Marr Oil Heat Machine Corporation

Model H, a vaporizing type oil burner of simple design, was developed during the past year.

This company reports an increase in sales for January and February, 1929, of 200% over the same period last year.



Marr Heat Machine

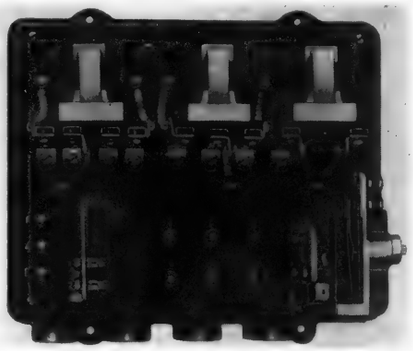
Mercoid Corporation

A low water cut out and pressure control, for use on low-pressure steam boilers, was announced during 1928 as an addition to the Mercoid controls. This device automatically breaks the circuit to the oil-burner motor when the water level falls, and also makes unnecessary the use of a separate pressure control, this being embodied in the design of the device. The Mercoid thermostat can be operated across the line with 110 or 220-volt current. Mercury tubes are used, so that there is no open arc. The tubes are tilted by the movement of bellows containing a volatile fluid which expands and contracts with temperature changes.

Another development of the Mercoid Corporation is the Interlock, a control to prevent burner operation in case of any failure. In case of failure of any part of the burner system, the device rechecks the cycle and stops the burner till the condition is corrected.

Minneapolis-Honeywell Regulator Company

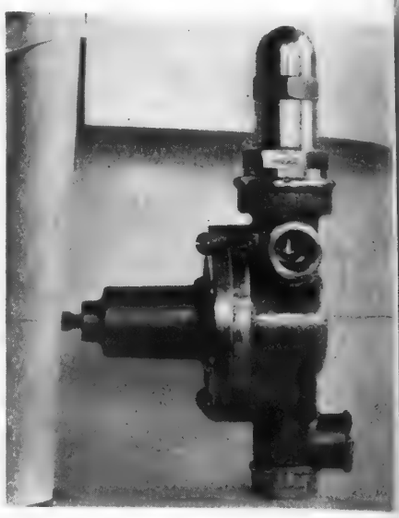
Three types of Protectorelays were placed on the market recently by this company. Each of these types must be used in connection with a Protectostat,



Type TIR-1 Minneapolis-Honeywell Protectorelay

Pyrostat, or F1 Combustion Safety control. Type BPR-1 is designed for the intermittent flame-type burner, having ignition, burner motor and oil supply start simultaneously. Type TIR-1 is designed to give a predetermined ignition period and a delayed return to the starting position each time the burner is stopped from any cause. Type PRO-1 gives pre-ignition and post-ignition of various timing, dependent upon the characteristics of the burner to be controlled. These instruments are safety devices which operate in case of the burner failing to ignite or becoming extinguished prematurely, and will recycle in case of current failure.

A limit control for steam boilers, the type H Pressuretrol, supplied for either high or low voltage, also was announced during 1928.



Monarch Strainer

Monarch Mfg. Company

This company, which announces an increase in sales of 70% for 1928 over 1927, is marketing a strainer for domestic oil burners. It is available in two sizes, ⅜ in. and ½ in.

William H. Pascoe Company

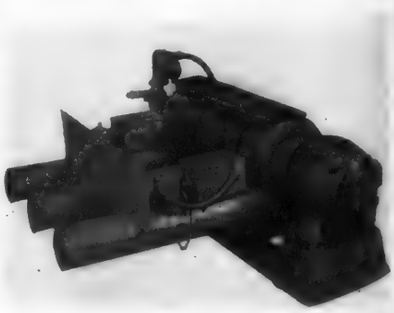
A new small burner, suitable for five, six and seven-room houses, was announced recently by this company to sell for $275 without tank. The burner is made in two assemblies, the motor and pump units, and the boiler-door, nozzle and pilot units.

Petrometer Corporation

A new Petrometer distant reading tank gauge, type F, is the latest product of this corporation. Similar in principle to the type C, this device has no moving parts. It is designed for the small tank with capacities around 275 gal.

Preferred Oil Burners, Inc.

Consisting of four sizes for industrial use, the Type M line of oil burners was announced recently by this company. A feature of this line is the double ignition system, with gas ignition in one line and electric ignition in the other, both working together when the burner starts. Another feature is that the flame



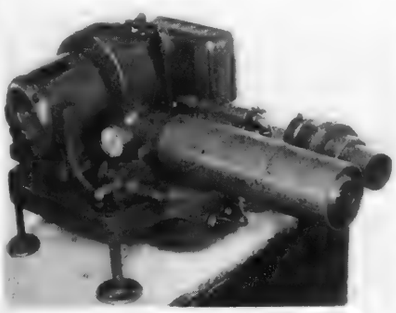
Type M Preferred-Hart

is distributed over the grate area instead of being concentrated in a ball or cone. The four burners making up the line are rated from 5000 to 20,000 sq. ft. of steam radiation.

An extensive billboard campaign was started by Preferred Oil Burners a few weeks ago. A monthly newspaper for Preferred-Hart dealers made its appearance March 15.

Progressive Machinery Company

Models A900 and A1200 oil burners made by this company, and announced within the last year, are equipped with Minneapolis controls and Century motors. The oil-control valve also is made by Minneapolis. The combustion chamber is made in three parts, so that expansion and contraction are easily taken



Type G Model 4 Progressive Burner

up. Air is admitted to the combustion chamber through four ports set at an angle, and which, in connection with six smaller ports in the center of the bowl, give the flame a circular motion. Ignition is obtained by means of either city or natural gas or Pyrofax. Model A900 has a capacity of 900 sq. ft. of water radiation, and model A1200 has a capacity of 1200 sq. ft. of water radiation. Fuel recommended for these burners is from 36°-40° gravity.

An electric oil burner of the high-pressure gun type will be exhibited at the convention for the first time. Model 4 has a capacity of 200 to 1000 sq. ft. of steam radiation, and Model 7 has a capacity of 1000 to 3000 sq ft. of steam radiation.

W. S. Ray Mfg. Company

Accomplishments recorded for this company, for the year of 1928, included the erection of a $70,000 addition to the San Francisco plant, which will make available over 40,000 sq. ft. of new floor space.

Reif-Rexoil Company

A new model of the Rexoil type D fuel oil burner and an improved model of the type C distillate burner were placed on the market by this company within the past year. It was announced that two new burners will be added to the line during 1929.

Type C burner is of the vaporizing, pot type. Oil flows into the pot over a vaporizing plate heated by a gas or oil pilot. A G.E. ⅛ H.P. motor, Detroit strainer, and the company's own safety overflow device, thermostat and controls are used. The use of 36° to 43° Be. gravity oil are recommended for this burner.

Rickard Engineering Corporation

A burner for large size commercial installations with 5000 to 10,000 sq. ft. of steam radiation, and known as the No. B3 automatic oil burner, has just been announced by this company.

The new plant in Brooklyn, into which this corporation recently moved, includes both iron and brass foundries, large machine shops and sheet metal works.

Stanley Furnace Corporation

A warm-air furnace designed to burn oil exclusively was perfected by this corporation last fall. The furnace is not equipped with an oil burner as sold, and dealers can install whatever oil burner they are selling. The jacket is finished in pale green, and makes an attractive installation.

Summerheat Corporation of America

The 1929 line of Summerheat burners, Types T9, S9 and Ideal 9, will be announced at the convention. Improvements in these burners consist of a design allowing a more silent operation and permitting their application to long sectional boilers. The Ideal 9 is an all

Summerheat Ideal Burner Installation

electric, high-low type burner equipped with a magnetic safety release to shut off the burner in case of current interruption of flame failure. The safety release does not supplant, but supplements, the Summerheat combustion safety control.

Sundstrand Engineering Company

An oil burner, Model A-2, for installations of 800 sq. ft. or less of steam radiation was developed by Sundstrand during the last year.

Super Oil Heator Company

Model G oil burner was announced by this company early in 1928. The entire burner is mounted in the base of the boiler in which it is installed, and the fuel line, made of copper tubing, is carried from the tank up the basement wall to the ceiling and along the ceiling to a point over the boiler, from which it is dropped to the boiler. Electric ignition is used, the spark jumping from a fixed terminal to a disc fixed on a rotating shaft below the nozzle. The motor is a repulsion-induction type, ¼ H.P., and runs at 1725 R.P.M.

Tabor Mfg. Company

Type D, sizes 1 and 2, oil burners were placed on the market by this company during 1928.

Taco Heaters, Inc.

A Super-Taco, insulated and jacketed, finished in colored enamel, was announced within the last two months by Taco. At the same time announcement was made of the Taco panel for oil and gas-burner installations. This panel permits the use of a connection for controlling the water supply in conjunction with the oil burner operation, simplifying electrical connections and allowing the owner to have year-round domestic water supply.

Time-O-Stat Controls Company

In January this company secured control of the business and assets of the Absolute Con-Tac-Tor Corporation, the Time-O-Stat Corporation, the Leachwood Company and the Cramblet Engineering Corporation. The resulting company will be a $2,000,000 concern with factory and general offices in Elkhart, at the former plant of the Absolute Con-Tac-Tor Corporation.

A line of low voltage controls, including temperature regulator, thermostat, and limit controls for vapor, steam, water and warm-air systems was brought out by the Time-O-Stat Corporation in 1928. Developments by the Absolute Con-Tac-Tor Corporation last year consisted of the No. 77 Lockswitch, a high voltage

sequence control, and a new line of both high and low voltage Thermoswitches. The Convoswitch, a special thermostat for use in connection with oil burners in buildings where a wide temperature range is desirable, was announced by the Absolute Con-Tac-Tor Corporation last summer.

The Time-O-Stat Controls Company will exhibit some new controls at the convention, details of which are not available at the time of going to press.

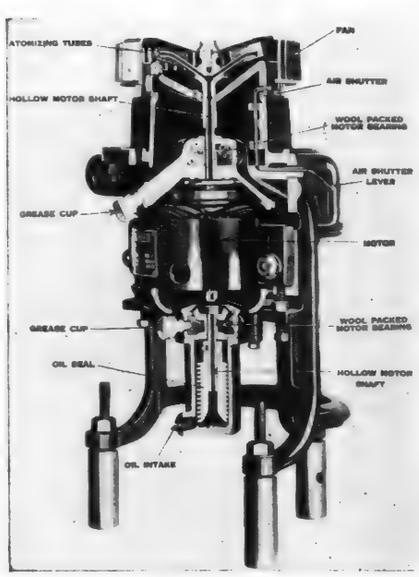
Tuthill Pump Company

The Model B oil pump brought out by this company recently is of the rotary type with internal gears. Packing is of the "two-zone" type, capable of holding a pressure of 300 lbs. per sq. in. or a vacuum of 28 in. This pump has a capacity of 60 gal. of kerosene per hr. at 1300 R.P.M. under a pressure of 100 lbs. per sq. in., the current consumption being 100 watts under these conditions.

Timken-Detroit Company

A new rotary burner was announced by Timken-Detroit recently. Gas ignition is used in this device, which will sell at about $50 less than the all-electric Model 20. A cast-iron frame is used to support an electric motor with a hollow vertical shaft. Oil is taken from the bottom of the burner through the hollow shaft to the head where it is thrown from the rotating tubes. The motor is 1/15 H.P. and operates on 110-volt current. Controls consist of a panel, protectostat, magnetic oil valve, magnetic gas valve and thermostat and boiler control.

Sales records for this company show that for one month in this past year retail sales of the Timken oil burner from the factory branches were more than double the combined Timken and Socony sales for the same month of last year.

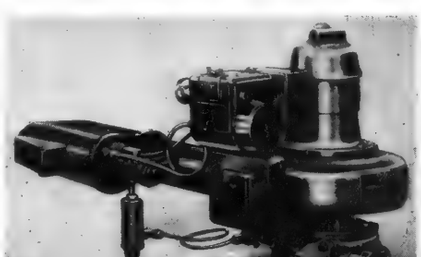


Timken Rotary

Wayne Home Equipment Company

The Wayne type D oil burner, recently developed, is equipped with a combination gas and electric ignition, and all electric ignition can be supplied at the buyer's option. The motors are of vertical type, direct-connected to the fan and pump. A Sturtevant fan is used, with volume adjustment. The oil recommended for these burners is 28° to 30° gravity. Model D3 has a capacity of 1500 sq. ft. of steam radiation and Model D4 will carry 4200 sq. ft. of steam radiation.

Sales for January and February show a 60% increase over the same period in 1928. An eastern plant in Brooklyn, N. Y., was recently established by this company since it purchased the oil burner and refrigerator division of the Wayne Company.



Type D Wayne

Williams Oil-O-Matic Heating Corporation

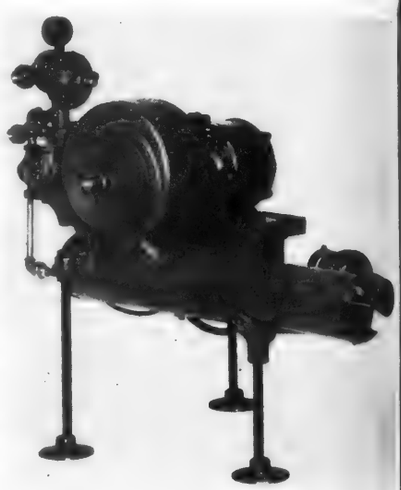
An oil-burning heating stove, the Dist-O-Stove, has been placed in production by the company. This heater, which is octagon shaped, is suitable for cottages, camps, garages and bungalows. It can be supplied complete with a self-contained 5-gal. tank or can be used with an outside tank. Fuel consumption ranges from 3 to 8 gal. of oil per day, depending on the heating requirements.

The 1929 plans for this company include the erection of a $50,000 plant to house the Dist-O-Matic and Ice-O-Matic departments.

Winslow Boiler and Engineering Company

The Kleen-Heet Challenger, announced some months ago, is a low-priced vaporizing burner using regulated chimney draft. A gas pilot is employed. The oil is vaporized at the bottom of the pot and the vapors are mixed with air as they rise.

The burner is fully automatic, operating intermittently, and uses oil not heavier than No. 1. It is recommended for use in homes having less than 500 sq. ft. of steam radiation.



Kleen-Heet Model 805

Some changes also have been made in the No. 805 Kleen-Heet. This burner is equipped with a Viking pump, in which the pressure of the oil is not carried against the packing. Webster transformers and Minneapolis controls are used. Capacities range from 600 to 6800 sq. ft. of steam radiation, the capacity being varied by changing the nozzles.

Editor's Note: Several announcements and photographs were received too late to be included in this issue, but which will appear in May.

Whispering Flames, the house organ of the Silent Automatic Corp., Detroit, Mich., contains in the March 1st issue an interesting article on "Where Oil Comes From and How It Gets Here," in which J. Harris, the chemist of the Silent Automatic Corporation, tells briefly of work in the oil field. This issue also contains an interesting suggestion from the Silent Automatic dealer in Omaha, who, in order to dry out the hearth in the shortest possible time due to the severity of the weather, used a large radiant electric heater set up in front of the ash-pit opening, so as to throw the heat under and through the hearth. The hearth was dried out so quickly that it was possible to turn the heat on that night.

The Williams Oil-O-Matic Heating News for March 7, contains photographs of the Williams Sync-O-Matics and the Williams Mel-O-Matics, the orchestras whose music is being broadcast by the Williams Oil-O-Matic Heating Corp., Bloomington, Ill.

An illustration is shown of a novel and attractive basement in which a Williams Oil-O-Matic is used, the rest of the basement being available for tables and chairs.

The Oil-Burner Problem from the Heating Contractor's Viewpoint

By E. B. Langenberg

President, Langenberg Manufacturing Co., St. Louis, Mo.

EVER since the marketing of oil burners reached an impetus that made them a factor in the heating business, I have felt that it was developing into a business of its own. A business, however, that was closely associated with the heating industry. The movement came so rapidly that most of the heating fraternity hesitated to invest money in research and development, as the expense necessarily would be considerable, and yet every one seemed to have the feeling that he ought to get into it. Thus, as the oil-burner industry was able to secure outside capital for its sales program, which was developed prior to the actual starting of research, it soon developed into a business of its own requiring considerable capital, an organized service department, and an engineering sales organization.

A few blizzards and a few icy storms which put electrical connections out of business and showed the necessity for having a service organization available on short notice, threw a scare into a great many dealers and prospective dealers and also had its influence on the heating industry.

One of the greatest drawbacks to the adoption of an oil burner by the heating contractor has been the intensive sales effort to put the oil burner on the market. There is no question but that oil burners *were* sold under absolute misrepresentation by men incompetent to sell this class of goods, and as the heating contractor came in contact with the householder and learned of this misrepresentation he naturally was discouraged. So many contradictory statements were made as to what oil burners would do in boilers and furnaces, whereas the facts in the case were so meager and not backed by authority, that the whole industry was discredited unjustly, and certainly unfairly.

These unbalanced situations are rapidly being placed on a more satisfactory basis, as the heating men are commencing to cooperate with oil-burner installers, and oil-burner installers are cooperating with heating contractors in checking old jobs and working together on new problems. This is as it should be, as the customer can get a square deal from both parties.

A number of papers have been presented at various meetings of oil burner associations to the heating engineers, manufacturers and installers of heating apparatus, and this exchange of practical, scientific and ethical information is highly desirable from both sides of the problem and all concerned will prosper to a greater extent than heretofore.

Where either the Standard Code of the Warm-Air Association or the Certified Heating Plan of the Heating and Piping Contractors National Association is used to check old jobs in which an oil burner is to be installed, then the oil-burner installer can determine accurately the size of burner that he must use and can determine accurately that the plant is in condition to receive his apparatus.

On the other hand, the heating contractor by advising the oil-burner installer of the B.T.U. requirements of the house can be assured of a burner of the correct capacity which will function in the plant that he has designed.

There is one thing that in my personal opinion is absolutely necessary. Where an oil burner is to be installed in an old plant that has previously used solid fuels, that plant must thoroughly be cleaned and entirely recemented with asbestos cement before the oil burner is installed and operated, and the heating contractor is in a better position to do this service work than anyone else.

The same type of mechanic would hardly be capable of making a burner installation with its electrical combination and its adjustment of air and gas.

Oil-burner installers who tie up their installation and service work with the companies that can give the best service on furnaces and boilers are securing excellent results, and the old problem of "passing the buck" has been eliminated, and the consumers are more satisfied.

Where a heating contractor can establish, with proper financing, an oil-burner department, it is possible that the two would work harmoniously together, but there would be a tendency to eliminate cooperation again on heating plant service with other oil-burner installers.

My conclusions are that at least for the present the two industries should function separately but cooperate in such a way that the public will benefit by their joint effort and then both will prosper.

Annual Meeting of Chicago Oil Burner Association

At the annual meeting of the Chicago Oil Burner Association, held Tuesday, March 19, application for associate membership of the Chicago Fuel Saver Company was accepted. P. E. Fansler, editor of *Oil Heat*, made a few remarks, after which the secretary-treasurer, Cliff W. Presdee, submitted the annual financial report. This report was accepted. H. A. Adams then reported on a recent conference with executives of the *Chicago Tribune*.

H. E. Risher, chairman of the entertainment committee, outlined a preliminary arrangement for the annual association golf tournament to be held early in May. President Straight appointed the nominating committee as follows: C. H. Foulds, B. G. Kauffman and H. E. Risher. The committee submitted to the meeting candidates for the various offices as follows: President, J. L. L. McCormack; vice-president, R. E. Norris; secretary-treasurer, Cliff W. Presdee; members of the board, R. S. Beale, Homer Linn, E. W. Miles, F. C. Staples. The secretary was instructed to cast one vote for the unanimous election of the candidates. Lyle Straight will serve also on the board as past president of the association.

Newly-elected President McCormack took the chair, and after a brief talk outlining the anticipated activities of the association for the next year, called upon each of the newly-elected officers for a few remarks. A rising vote of thanks was given Lyle Straight for his efforts in behalf of the association's welfare. President McCormack then announced the following appointments as chairmen of the standing committees: entertainment, H. E. Risher; fire investigation, L. G. Briggs.

? ? ? ? ? appears as the title of a semi-monthly newspaper published by Preferred Oil Burners, Inc., Peoria, Ill., on its first issue. $50 is offered for a name for this new tabloid paper which will be distributed to all Preferred-Hart dealers. This first issue contains information for the dealer on the spring advertising campaign, for dealers who will be given factory cooperation in advertising and sales through billboard and direct mail advertising. An illustration and description of the new type M3 Industrial Hart burner is included.

Large as Well as Small Homes Are Equipped with Gas House-Heating Appliances in the Public Service Company of Northern Illinois Territory. The House Shown on the Opposite Page is an Interesting Contrast with This Residence

The Economics of House Heating with Gas

By J. D. Preble and W. F. Miller

Engineers, Public Service Company of Northern Illinois

ECONOMICS of gas house-heating has at least two angles presenting many problems and requiring much thought, first on the part of the customer contemplating the use of gas or the customer who is using gas for heating, and, second, on the part of the utility company which has this load now and which intends to progress with the growth of this business.

As we progress, making more and more contacts, the fact that the heating plants in a great proportion of the homes of today are just cause for damage suits by the owners is impressed upon our minds. The same fact also applies to the construction of homes, many of which are built in a manner that makes it physically impossible to heat them comfortably in near-zero weather.

Granting that these conditions exist, it is easy to realize the responsibility that must be accepted by a utility company when gas heating is installed in the average home of today. Utility representatives promoting the sale of this business must be competent and well trained in pointing out errors in the existing heating system and must know how to correct existing faults. These men must have a full realization of the position in which they are placing their customer in advising an expenditure of from $500 to $1000 in the average home for equipment to heat with gas efficiently, and in asking the customer to pay an increased fuel bill, greater in fact than that required for any other heating medium excepting electricity. Experience indicates that the customer feels that this investment is justified if in return he gets a comfortable and automatically heated home.

At the first mention of the price situation, the question of just what percentage of the public can pay the price in the average home, becomes prominent. This question is of course relative to the community under consideration. An illustration can be taken from Chicago suburbs. Kenilworth, on the north, having a population of approximately 2700, with 503 gas accounts on January 1, 1928, has 92 gas-heated homes. This means that better than 18% of the homes were gas heated. Berwyn on the west, which had 11 gas heated homes on January 1, 1928, should have had approximately 2000 on a basis comparable with their 35,000 population and their 10,913 customers.

Consider this same problem from another angle; a comparison of the values of satisfaction and service to home-owners of automatic, clean, labor-free heat, in varying localities. Servants are in practically every home in Kenilworth, while but a very small percentage of the Berwyn homes can support them. The servants can give the required attention to a heating system at very little, if any, inconvenience to the home-owner, while every attention to the heating plant must be given by the owner where there is no servant.

Many facts are obvious from the above comparisons. The class of homes in which gas heat renders greatest service is the moderately-priced home occupied by people with moderate salaries. Gas heat in its ultimate expansion, therefore, must be within the reach of this class of people, and when those forces which will bring the cost of gas heat within the reach of the very large percentage of the public have been experienced, the general acceptance of gas heat will be

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From a paper presented before the Western Society of Engineers, Chicago.

realized and it will not be a selling problem, but one of gas manufacture and distribution. That these forces are being felt at the present time is indicated by the fact that the local sales of gas heating installations at the present time are in the moderate priced homes. A check of our own sales tendencies, which are only an indication of general conditions, shows that during this past year, smaller sized boilers and furnaces are the ones which are in greatest demand. That is to say, where we used to sell a boiler which would care for approximately 1200 sq. ft. of water radiation, our average has now dropped to the boiler necessary to heat the home with approximately 800 sq. ft. of radiation. At the present time our heaviest demand is for boilers heating homes having between 500 and 600 sq. ft. of radiation. This means that these boilers are going in five to six-room homes.

Unit Cost Higher Than Other Fuels

A careful study of those forces which will bring gas heat into common usage in all types of homes delves into the economics of using the various fuels. The first conclusion that is most natural would be a reduction of gas rates. The present process of gas manufacturing makes this economically impossible. A review of gas rates over a period of the last five or six years does show, however, that there is a general tendency to a lower level, while the cost of coal, coke, oil and other fuels is decidedly upward. A comparison based on the present rates does not show gas to be so much more expensive than other fuels, the great difference existing in popular opinion.

Gas equipment today is designed to generate 80% efficiency under proper operating conditions. Hard coal may generate 40% efficiency under conditions similar, and oil combustion 50%. The average manufactured gas has 535 B.T.U. per cu. ft.; hard coal has a heat content of between 13,000 and 14,000 B.T.U. per lb., and oils range from 120,000 to 160,000 B.T.U. per gal., the lighter oils, which are required for oil-burner operation running close to the 120,000 B.T.U. figure.

14,000 x 2,000 = 28,000,000 x 40% = 11,200,000 B.T.U. effective heat per ton of hard coal.

535,000 x 80% = 428,000 effective B.T.U. of heat per M cubic feet of gas.

$$\frac{11{,}200{,}000}{428{,}000} = 26{,}170 \text{ cu. ft. of gas equivalent to one ton of hard coal.}$$

$$\frac{11{,}200{,}000}{120{,}000 \times 50\%} = 187 \text{ gal. of oil, equivalent to one ton of hard coal.}$$

Gas at 85 cents per M cubic feet is, therefore, equivalent to burning hard coal which costs $22.25 per ton, or burning oil at

$$\frac{\$22.25}{187} = 12 \text{ cents per gal.}$$

At present hard coal is retailing at from $16 to $17.50 per ton delivered in the basement, and fuel oils range from 7½ to 10 cents per gal., depending upon delivery lots and grade used. In other words, gas fuel is costing users in this comparison, 35% to 50% more than the baser fuels.

The fuel situation is one which is gradually favoring gas and the tendency in construction of homes also should be another force favoring gas. As fuel prices increase it is economically sound to invest more and more money in the proper insulation of the home to conserve the heat generated. Definite and conclusive proof of the value of proper insulation can be collected from every insulated home. Some concrete examples showing two phases of this problem are presented here; first, consideration of the value of insulation in homes already built. These are records of heating costs in homes before and after insulation.

Case No. 1. Brick Bungalow

Uninsulated. 711 sq. ft. hot water radiation. Sept. 19, 1924, to June 24, 1925:
Cubic feet used.....520,400
Net charge $398.50

Roof lined with 2-in. insulating board. Sept. 22, 1925, to June 28, 1926:
Cubic feet used.....481,200
Net charge $368.58

Fuel requirements were 12% greater during 1925-26 than in 1924-25. Apparent savings—23%.

Case No. 2. Home

655 sq. ft. hot water radiation. Uninsulated. Dec. 8, 1924, to June 8, 1925:
Cubic feet used.....545,800
Net charge $415.34

Attic floor insulated with 4-in. fill. Oct. 16, 1925, to June 17, 1926:
Cubic feet used.....469,400
Net charge $374.43

Fuel requirements were 16.5% greater during 1925-26, than during the period of 1924-25, in which this customer used gas for heating. Apparent savings—29%.

Case No. 3. Brick House

560 sq. ft. hot-water radiation. Uninsulated. Aug. 19, 1924, to June 15, 1925:
Cubic feet used.....335,000
Net charge $259.75

Roof lined with one layer of insulation material. Aug. 5, 1925, to June 5, 1926:
Cubic feet used.....386,200
Net charge $297.39

Fuel requirements were 12% greater during 1925-26, than in 1924-25. No apparent savings.

Smallest Gas-Heated Home in the Territory Served by the Public Service Company of Northern Illinois

Compact Arrangement of Gas Appliances in Small House Shown at the Left. Boiler supplies 215 sq. ft. of Water Radiation

Laying 30-In. Gas Main in Recent Extension of Lines of Peoples Gas Light and Coke Company, Chicago

CASE NO. 4. FIVE-ROOM BRICK HOUSE

274 sq. ft. steam radiation. Uninsulated. Dec. 3, 1925, to July 12, 1926:
Cubic feet used.....440,400
Net charge $343.79
Roof lined with one layer insulating board. Oct. 26, 1926, to July 27, 1927:
Cubic feet used.....439,600
Net charge $339.95
Fuel requirements during 1926-27 heating season were 16.1% greater than period from December 3, 1925, to July 12, 1926. Apparent savings—17%.

CASE NO. 5. EIGHT-ROOM HOUSE

800 sq. ft. hot water radiation. Uninsulated. Sept. 25, 1924, to June 25, 1925:
Cubic feet used.....596,000
Net charge $454.90
One layer of insulating material in roof. Sept. 24, 1925, to June 24, 1926:
Cubic feet used.....609,400
Net charge $464.81
Fuel requirements were 12% greater during 1925-26 than in 1924-25. Apparent savings—10%.

CASE NO. 6. HOUSE

560 sq. ft. hot water radiation. Uninsulated. Oct. 27, 1925, to July 28, 1926:
Cubic feet used.....397,400
Net charge $309.48
One layer of insulation board laid in attic floor. Oct. 28, 1926, to June 6, 1927:
Cubic feet used.....320,800
Net charge $244.83
Fuel requirements were 9% less in 1926-27, than in 1925-26. Apparent savings—16%.

CASE NO. 7. SIX-ROOM BUNGALOW

650 sq. ft. hot water radiation. Uninsulated. Sept. 26, 1924, to May 25, 1925:
Cubic feet used.....396,000
Net charge $304.22
Attic floor insulated with 4 in. of fill. Oct. 26, 1925, to June 22, 1926:
Cubic feet used.....371,800
Net charge $285.26
Fuel requirements 12% greater during 1925-26, than 1924-25. Apparent savings —18%.

CASE NO. 8. STUCCO HOUSE

455 sq. ft. hot water radiation. Sept. 24, 1924, to July 24, 1925:
Cubic feet used.....380,400
Net charge $294.04
Attic floor insulated with 4-in. of fill. Sept. 24, 1925, to July 28, 1926:
Cubic feet used.....318,200
Net charge $246.91
Fuel requirements 12% greater during 1925-26, than in 1924-25. Apparent savings—25%.

CASE NO. 9. TWO-STORY BRICK HOUSE

920 sq. ft. hot water radiation. Uninsulated. Sept. 17, 1924, to June 17, 1925:
Cubic feet used.....638,800
Net charge $487.30
Attic floor insulated with 4 in. of fill. Oct. 16, 1925, to June 17, 1926:
Cubic feet used.....659,600
Net charge $502.08
Fuel requirements 12% greater during 1925-26, than in 1924-25. Apparent savings—7.8%.

In each of the above cases the home was heated one or more years before the insulation was placed in the ceiling, and one or more years afterward. The results are variable, depending almost entirely upon the type of home, the greatest saving being effected in bungalows where the percentage of heat lost through the ceilings was very high in comparison to the heat loss in the side walls.

The second consideration is the matter of insulation in the homes that are being built. Examples taken from various points throughout the country are summarized herewith in which heat losses were estimated for the houses without insulation and compared with the actual heating cost of the house as built.

EXAMPLE 1. ST. PAUL, MINN.

Estimated heat loss (insulated) 1273 B.T.U. per degree per hour or 30,600 per 24 hrs.

Estimates gas required for heating season 542 M. cu. ft.
Cost at 90 cents per M.....$487.80
Less 10% for period of reduced temperature 48.78

Net estimated cost.....$439.02
Cost per 1000 cu. ft. of heated space 21.84

Same house if built uninsulated:

Estimated heat loss 1874 B.T.U. per degree per hour or 45,000 per 24 hrs.

Estimated gas required for heating season, 798,000 cu. ft.
Cost at 90 cents per M.....$718.20
Less 10% for period of reduced temperature 71.82

Net cost (estimated).....$646.38

Observed results heating season Sept. 16, 1926, to June 15, 1927:
Gas consumed, 488,100 cu. ft.
Net charge for period, $442.89.
Total degree-days, 8176.

Well-Constructed Residence with Gas-Fired House-Heating System

EXAMPLE 2. DANVILLE, ILL.*

House brick veneer with attached brick garage, 9-in. brick wall and ceiling insulated.

Cubic contents, 34,000 cu. ft.

Net wall surface, 2425 sq. ft. brick veneer; 371 sq. ft. 9-in. brick.

Glass surface, 543 sq. ft. casement windows; 124 sq. ft. double hung.

Ceiling, 2170 sq. ft. lath and plaster with 4 in. of fill for insulation.

Floor, 1760 sq. ft. double floor and plastered; 410 sq. ft. concrete in garage.

Walls insulated with 3⅝ in. of fill.

Estimated gas consumption, 575,000 cu. ft.

Estimated gas cost, $431.25.

Actual gas consumed, 515,000 cu. ft.

Actual gas cost, $386.25.

Cost of Insulating a Home

In both classes of homes insulation is definitely shown to be a great heat conservative. The point which should be carefully considered in the new home is the ability to forecast the cost of gas heating as well as the exact saving effected by insulating materials. The House Heating Committee of the American Gas Association made a study of adequate insulation in its 1928 report.† The summary of this finding is as follows:

The committee, in making the subsequent calculations, has taken a hypothetical home 30 ft. by 30 ft., full two stories high, ceiling heights, 9 ft. 6 in. (attic unfinished); 15% of the gross wall area to be glass; construction to be 4-in. brick, with 4-in hollow tile walls, finished with ½ in. plaster on top. This type of construction is assumed to be the average used throughout the country. To be sure, there are homes with more window area and there are homes with less window area. We find wall and ceiling construction better and we find construction worse. It is our desire that this home should represent the average.

It was stated in this report that to obtain a 30% reduction in the heat loss from this hypothetical house it would be necessary to invest $449.05 for insulation. To obtain a 20% reduction the cost of insulation would be $193.56.

The calculations showed that a saving of $176, or 18%, could be made on the first cost of the hot water heating system if insulation were applied. This is due to the fact that a smaller boiler and less radiation are necessary.

With the 30% reduction of heat loss effective, a like reduction in fuel requirements will result. Further calculations will show a return on money invested in home insulation of from 10% to 35%, depending on climatic conditions and gas rates. In other words, it is possible to pay for insulation from fuel savings in from three to five years in the average case, and in from three to ten years under conditions not so inclined to show its value.

These conditions mean that it will be but a short time until gas heat and insulated homes are necessities to a large part of the public. Owners of such houses will have fuel bills varying but little from those who use baser fuels in uninsulated homes, so that it will be sound economy for them to pay any existing difference for the better heated and more livable home. This will mean that instead of our gas heating customers being limited to about 5% of the public, 20% or possibly 25% of the homes will be of this type. The problems which this condition will bring to the utility can very well be illustrated by some of the conditions existing in our own company. A 20% covering in our territory today would mean that we would have approximately 40,000 heating installations in single-family dwellings. We now have approximately 1800 and are gaining approximately 600 installations per year.

Courtesy United States Gypsum Company.

Dry Fill Gypsum for Insulation Being Applied to House to Be Heated with Gas

New Gas Holder Made Necessary to Accommodate Increased Demand, Peoples Gas Light and Coke Company, Chicago

The expansion of this business brings fundamental changes that will affect the basic set-up of the gas companies as they exist today. Again permit us to draw an example from our own conditions:

We have a sales department of house-heating engineers, consisting of nine salesmen and one sales supervisor. Our sales and distribution of gas for house-heating to date are as follows:

Year	Sold	On Lines	Consumption
1923	77	77	.....
1924	119	196	53,000,000
1925	247	443	141,000,000
1926	476	919	329,000,000
1927	500	1419	600,000,000

Up to this time, this business has served more to saturate our distribution and production facilities and, for that reason, the additional capital investment has been very small in view of the volume of business obtained. If it were possible to take a cross-section of our business today, and sell no more gas boilers from this date on, we would have an approximate consumption of 600,000,000 cu. ft. of gas per year, which would improve the load factor and income of our total gas load to a great extent. We have reached the stage where any additional volume of this business will require additional production and storage facilities. The last part of this discussion is devoted to the fundamental characteristics of this load and just what problems they will bring to our engineers.

*A photograph of this house appeared in The Heating and Ventilating Magazine for December 1928, Page 82.

†This report was printed in The Heating and Ventilating Magazine for December, 1928, on Page 79, "Building Insulation—What It Costs and What It Saves."

A few other problems should be anticipated when a volume of this load is to be added. The territory should be carefully classified. For example: A, B, C, etc., territories. The A classification should consider those portions with buildings restricted to single-family dwellings upon which minimum cost restriction is placed, which will bring these homes in a class costing from $25,000 up, for the most part. The B classification should consider single-family dwellings of a more moderate cost, further classifications embracing territories where duplex and small apartment buildings are to be found, another class restricted to business blocks and the territory embracing industrial plants.

Our company has made such a classification and has arrived at a tentative schedule for installing service pipes. The class A homes have a minimum of one and one-half inch service, two-inch service to homes having from six to ten rooms, two-inch minimum services to homes of ten rooms and over. The B class homes are classified in the same manner as above, while the remainder are rated according to the gas load which we can anticipate in each.

This survey was made because we found that in a great number of cases services running into the homes were of insufficient size, when we began to anticipate demands from 400 to 600 cu. ft. in the average homes. It is our idea, when these services are installed in the first place, to make them of sufficient size to carry the anticipated consumption in the homes.

The previous part of this paper dealt with the house heating problem before it became a problem within our company. Here are some of the facts of the relation of the heating load to the domestic load, as it has reached the point where radical changes in operation and system design are necessary.

It is a fact that the domestic load is a direct function of the weather conditions. A careful study of this condition was made in our territory covering an area including approximately 45,000 customers. It was found that the daily consumption per meter varied from 120.5 cu. ft. of gas consumed per meter, on a day with a minimum temperature of 2.5°, to a consumption of 153.5 cu. ft. of gas per meter, with a minimum temperature of —10.5°. The exhibit below shows how the domestic consumption varies directly with weather conditions.

Date	Temp.	Send Out M.C.F.	Number of Customer	Max. Day Per Customer
Jan. 5, 1924	−10.5	6794	44,251	153.5
Jan. 17, 1924	2.5	5325	44,251	120.5
Jan. 20, 1924	1.0	6307	44,251	143.0
Jan. 21, 1924	−5.0	6359	44,251	144.0
Jan. 26, 1924	2.5	5565	44,251	126.0
Dec. 28, 1924	−4.5	6412	48,528	132.0

It also is true that the house-heating load is a direct function of weather conditions. A study of this problem also has been made of the boilers located in our entire territory. During this period of study, we have had no extremely cold weather, the day giving the maximum demand was December 5, 1926, at which time the minimum temperature was 3° below zero and the mean temperature was 6° above zero. On the day previous to that of our study, the temperature maximum was 57°. This dropped suddenly during the night time to a minimum of 3° below zero, and during the 24-hr. period of our study, the temperature raised somewhat after the minimum of 3° below zero had been reached. There also was a wind of a velocity of approximately 15 mi. per hr. during this period. The loads experienced during this time indicated that each boiler consumed an average of about 4032 cu. ft. of gas during the 24-hr. period of study.

Maximum Domestic and Heating Loads Occur Simultaneously

Another treatment of this same problem was made by G. E. McKana, of the Peoples Gas Light and Coke Company, Chicago, who has summarized his findings in a paper, "House Heating With Gas," given before the Illinois Gas Association, March 19, 1925. The day of maximum demand conditions during his study occurred on January 4, 1925. This 24-hr. period had an extremely low temperature, a mean temperature for the day of —10°. The weather had fallen to sub-zero conditions the day previous to his study and remained below zero during the entire 24-hrs. which he covered. Under these conditions, it was found that each boiler used approximately 6000 cu. ft. of gas per day.

From the above conditions it is quite evident that both domestic and heating maximum conditions occur simultaneously and in intensity are a function of the weather.

As the maximum conditions of load are a pure function of weather, we confront a problem vastly different from past experience. In the past the maximum load has occurred on holidays and special operating provisions could be made. With this problem so changed around weather is a deciding factor, we cannot anticipate these loads and must design our system with a greater factor of safety in order to meet the most severe conditions which might arise.

To present this problem in a concise manner, we show the results of a study of a certain section of our territory. This territory embraces about 30 sq. mi., which, for the most part, is residential; thus the house heating and the domestic loads are practically the only ones which affect our calculation. A cross-section of the homes in this area shows that the homes in the western and southwestern parts are of moderate class, while the north and northeast sections are built up with some of the finest suburban residences, the major percentage of which are or will be heated with gas.

The rate of growth in this territory during the period of study is represented by the following figures:

Year	Meters	Boilers
1927	20,000	600
1928	23,300	849
1929	25,760	1062
1930	28,210	1374
1931	30,910	1687
1932	33,610	2000

Taking as a basis, that each domestic customer in this territory will consume approximately 40,000 cu. ft. of gas per year, we have an annual total output of domestic load of 1,344,400,000 cu. ft. of gas. The 2000 boilers with an approximate consumption of 500,000 cu. ft. per boiler per year, give a house heating load of 1,000,000,000 cu. ft. per year. That is to say, this territory under these conditions will have a boiler load equal to between 42% and 43% of the total.

An interesting fact to note at this point is the effect of this house-heating load on our hourly, as well as daily, maximum demand. On the curves showing the maximum day for 1929, we find a maximum hourly output of 815,000 cu. ft. occurring on a holiday, the maximum hours being between ten and twelve o'clock in the morning. We find that the maximum day in the winter has two maximum hourly periods of almost equal volume, between eight and nine o'clock in the morning and between five and six o'clock in the evening. Let us direct our attention to the estimated maximum day demands for 1932. We find that the maximum hourly demand for domestic load is between five and six o'clock in the evening, but that the maximum hour of the maximum day occurs between seven and eight o'clock in the morning.

Since we have shown definitely that the heating load is a pure function of the weather conditions, it is, therefore, a seasonal one and, as stated in the opening remarks of this paper, we are now confronted with the problem of balancing the seasonal loads with other off-peak loads so that each additional volume of business will pay its own way.

The fact that more than 40% of our total output will be house heating, based on the figures presented, means that at least 40% of our manufacturing and distribution equipment will be idle during the summer months. This condition we must meet with satisfactory rates and other inducements to add a load during the summer months.

Heating and Ventilating Research at Engineering Universities

By Samuel R. Lewis

An idea of the extensive research being carried on by the American Society of Heating and Ventilating Engineers was presented in a paper by the author, who formerly was chairman of its Committee on Research. This paper entitled "Research as Applied to Heating and Ventilating," was read before the Fourth Mid-west Power Engineering Conference in Chicago, February 14, 1929, and tells of the arrangements which the society has made with various engineering colleges throughout the country.

An opportunity came early in 1927, for making a cooperative arrangement with the exceedingly progressive University of Wisconsin, whereby research would be carried on at Madison under our general technical direction and approval, and under a joint expense account. This idea of cooperative research has proven very satisfactory to all concerned. It enables the university to make close contact, without any cost, with the leaders in engineering thought in other universities and in industry. It gives a practical aspect to the often otherwise routine work of the students. It trains research workers. It lends authoritative prestige to the output.

There are already in our literature exceedingly valuable papers from the University of Wisconsin, on air infiltration, and we will soon publish the results of a year's work on the leakage through various kinds of wall. We apprehend that these results will express among other things, to a startling extent, the effect of quality of workmanship in masonry walls.

A unique arrangement at the Madison laboratory is that heavy structural steel frames have been devised in which any desired number of sample walls, each about eight feet square and of any desired thickness, can be built in the open and allowed to dry out; then they can be moved into the testing apparatus and have their leakage rate quickly determined. Prior to this arrangement, when the walls were built inside the testing machine, it sometimes took six months or more for a wall to dry out enough to reach a state of stability so far as infiltration is concerned.

At the University of Minnesota we have what are probably the most complete facilities available for testing the conductivity of materials. Both the hot plate and the hot-box electrical methods are in use. This work has to do most intimately with the amount of heat-generating and transmitting apparatus the heating engineer shall provide for the building.

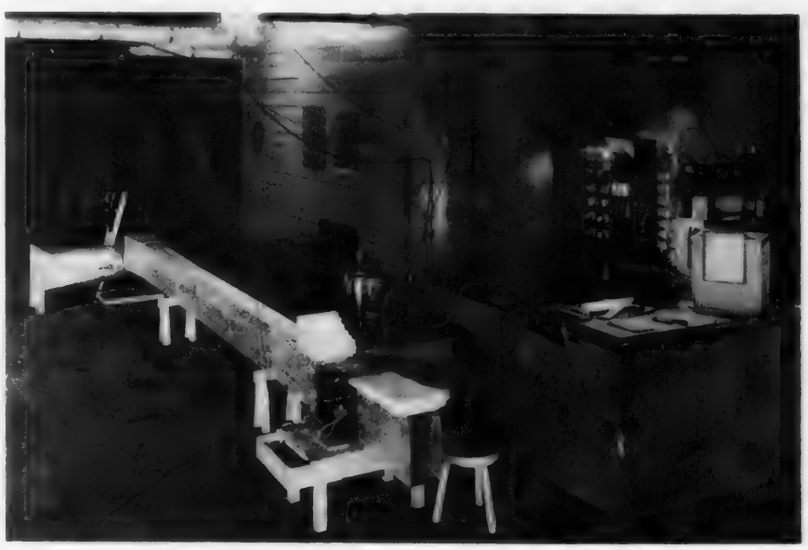
In the development of the use of the comparatively recent building-insulation materials, so potent in their effect on operating costs and gas and oil fuels, our laboratory is giving an important service.

The tendency has been for the inventors and manufacturers of insulating materials to be rather more optimistic than otherwise, as is humanly natural. A given wall construction, for instance may show in all truth a conductivity rate of some number of heat units per degree temperature difference between the two sides, and the manufacturer may so advertise in the best of faith. He may know that with an air temperature of 100° near the ceiling of a normal uninsulated 70° breathing-line room, he has an attic-air temperature of 40°. He may not and usually does not know that after the insulation shall have been applied to that ceiling the air near the ceiling under the insulation may be still warmer than it was before, while the attic, no longer receiving a great flow of heat from below, due to the insulation, may drop from the former 40° to zero or below, thus giving a considerably greater temperature difference than that on which the optimist based his calculations, and showing a much smaller saving due to insulation than that which he at first estimated.

The heaviest demand for gas boilers today is for the small homes having from five to six rooms, and a surprising number of these small installations are being made. Gas gradually is being sold at a lower price while other fuels are rising in price, and this militates in favor of homes insulated against rapid heat-flow. Experience has demonstrated that it is easy to gain a return in cost of fuel saved of from 10% to 35% on money invested in house-insulation. The cost of the heating apparatus can be reduced around 18% by a reasonable and justifiable investment in better building construction.

Research by the American Gas Association has developed the interesting fact that the domestic gas load for cooking, water heating, etc., follows the weather conditions, increasing noticeably as the weather gets colder and decreasing as it gets warmer. It is very clear that both domestic and heating demand for gas occur simultaneously and that in intensity they are a function of the outside temperature.

At the University of Minnesota it has



Outside of Hot Box Apparatus at University of Minnesota. Fan at Left Produces Air Currents for Determining Surface Coefficients

General Arrangement of Test Plant for Air Infiltration Experiments at University of Wisconsin

been shown that the efficiency of an air space in the wall of a building is increased rapidly as the thickness of the air space is increased, up to about ¾ in., after which the heat resisting efficiency of the air space increases very slowly as the space is widened. This is with reference to small air spaces in which interior convection air currents do not interpose their potent influence. It is well known that large air spaces in walls, especially if they have considerable height, allow interior air currents, up the warm side and down the cold side, which are not conducive to effective retention of heat within the building.

At the University of Minnesota a code is being developed for the uniform testing of air cleaning devices. The difficulty which has handicapped us in the past is that the measurement of the effectiveness of any air cleaner depends on some standard form of dust determinator. Years of study in many leading nations of the world have been given to the development of a dust measuring machine, but we have today no universal acceptance of any particular type of measuring machine or method, and therefore we have no relative standards of efficiency of cleaning devices.

A study has been made of the Hill machine which draws a sample of dusty air through an orifice, impinging the dust on a sticky ruled object glass, where the particles can be counted under a microscope. A special apparatus has been devised in which several orifices and object glasses are arranged in series and it has been proved that which this machine from 80% to 85% of the dust in a given sample sticks to the first object glass. The most effective distance from the orifice to object glass has been determined and it is known that any standard method of laboratory dust filter testing by this method must provide for a specific air velocity through the orifice of the dust determinator.

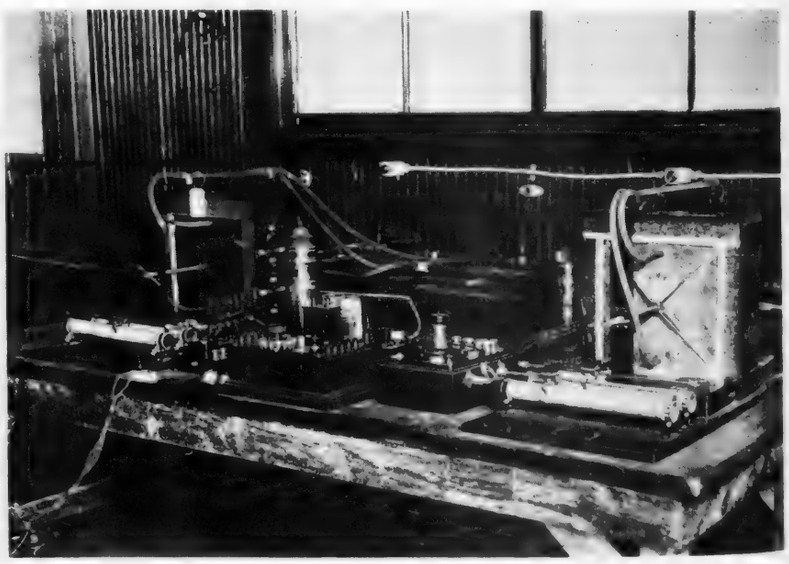
The smoke problem in cities gets worse year by year, but is more troublesome in some cities than in others. Some cities have a higher death rate from those diseases which we think have to do with air conditions than do other cities. In cooperation with the Weather Bureau, our laboratory is going into this matter with considerable elaboration. We know that results may be attained by this study which will be of undreamed of value.

For instance, each Weather Bureau keeps a record of the hours of sunshine each day. The automatic sunshine recording machine, however, must be favored with a twilight-correction factor, being an allowance for the varying interval between true sunrise and true sunset and the time when the sun is high enough above the horizon to penetrate the overhanging cloud of smoke and dust and so sensitize the instrument. We suspect very strongly that we have discovered that the twilight-correction is a true measure to a degree, of the amount of suspended impurities in the air above cities. We hope soon to prove or to disprove this suspicion, and to check authoritatively over a period of years, the apparent truth that the twilight-correction factor consistently is lengthening.

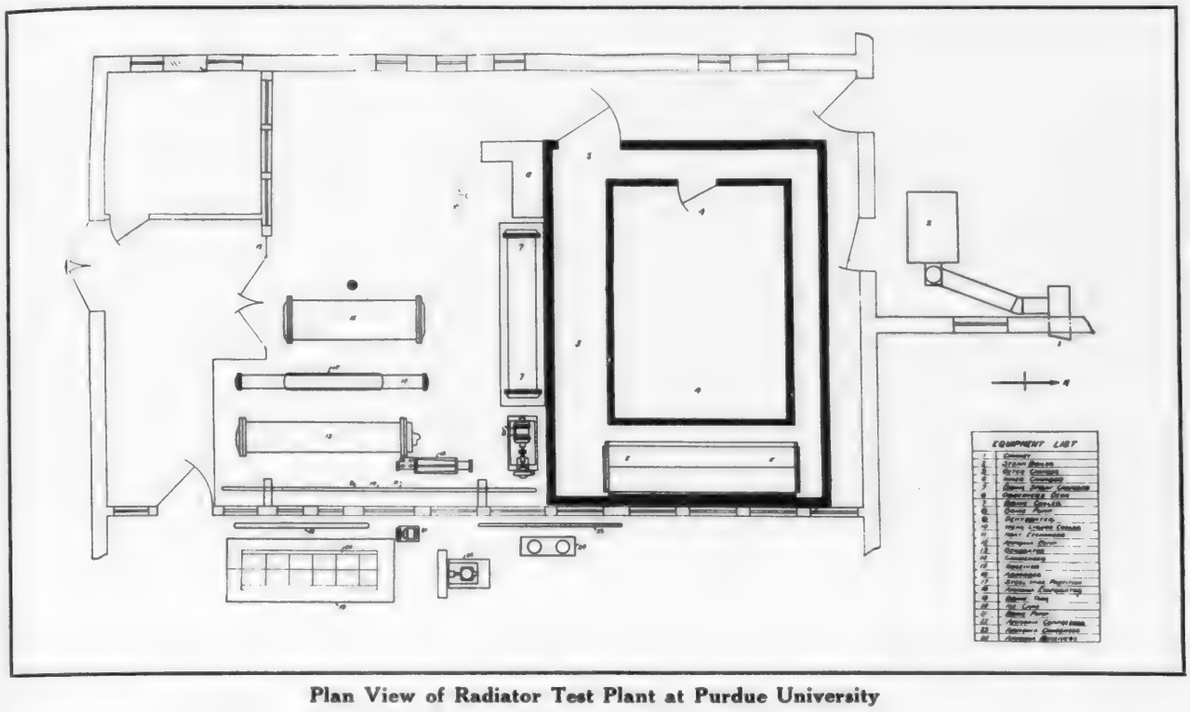
The Research Laboratory has arranged with the Weather Bureau to have simultaneous daily observations made of the dust in the air, all with the same dust determinator in the following thirteen cities: Atlanta, Boston, Chicago, Cleveland, Denver, Detroit, Lincoln, Neb., Madison, Wis., New York, Pittsburgh, St. Louis, Washington, D. C., and Salt Lake City. We have arranged with the health departments of these thirteen cities to furnish us the statistics of the daily incidence and mortality of the infectious diseases in the standard international list of communicable diseases.

The results will show for the first time the relative air cleanness of the cities, using identical measuring-technique, and this data will be coordinated with temperature, humidity, wind velocity, sunshine and twilight-correction, as well as with health conditions. Illness may or may not be a function of dust. These determinations should help to settle the suspicion.

At Harvard University, with the School of Public Health, we are carrying on cooperative research on heating and ventilation in its relation to health and



Two 12-In. Hot Plates with Temperature Control Equipment Used in Testing Insulating Material, University of Minnesota



Plan View of Radiator Test Plant at Purdue University

comfort. Exceptional laboratory facilities are available there especially as evidenced in imported apparatus for the most delicate psychological, as well as physical, observations.

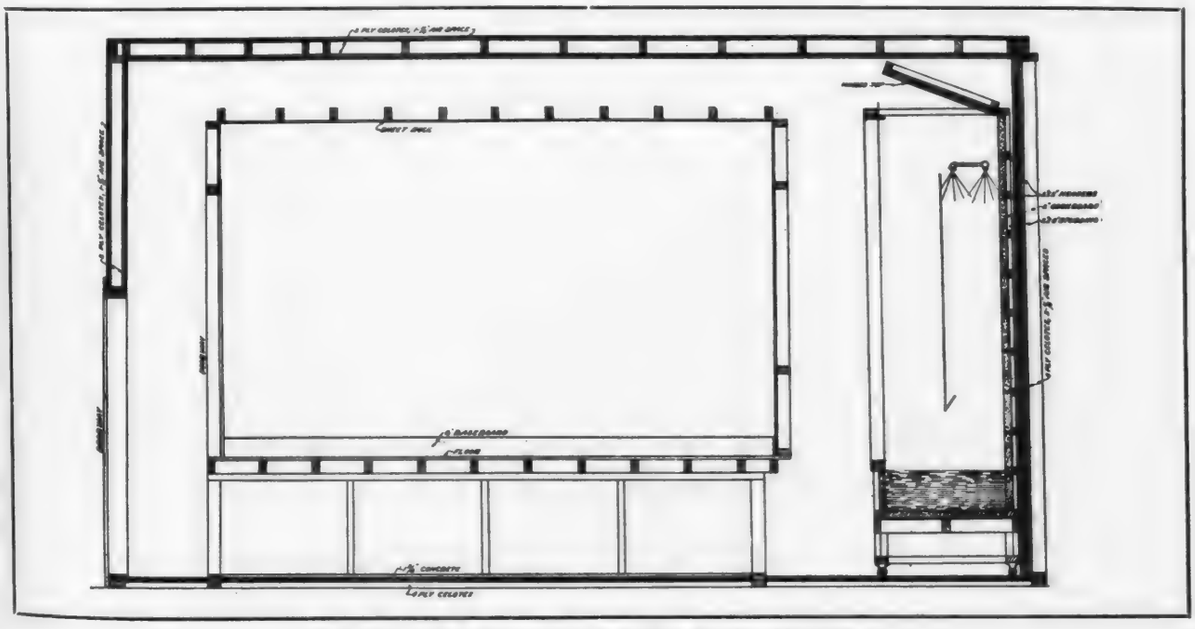
A radiator testing laboratory has been built at Purdue University to fulfill the most modern conception of what such a plant should comprise, and work is intensively under way. There is a strong demand for data to check radiator ratings published by sometimes over-optimistic manufacturers, and we hope to make Purdue, with our cooperation, an authoritative court of last resort on the subject. There are so many recent improvements in radiators, concealed and exposed, direct and indirect, copper and brass, that the test codes of former days may be obsolete.

At the University of Kentucky we aided in the construction and inauguration of one of the most complete boiler testing laboratories in existence. Facilities are there provided for the rapid and authoritative testing of any kind of heating boiler, with up-to-the-minute instruments. An exceedingly interesting feature at this laboratory is the arrangement whereby every possible happening and variation during a test is recorded automatically, thus checking and fortifying the human element. Even the opening of a fire or draft-door is recorded by a machine as to duration and time of incidence.

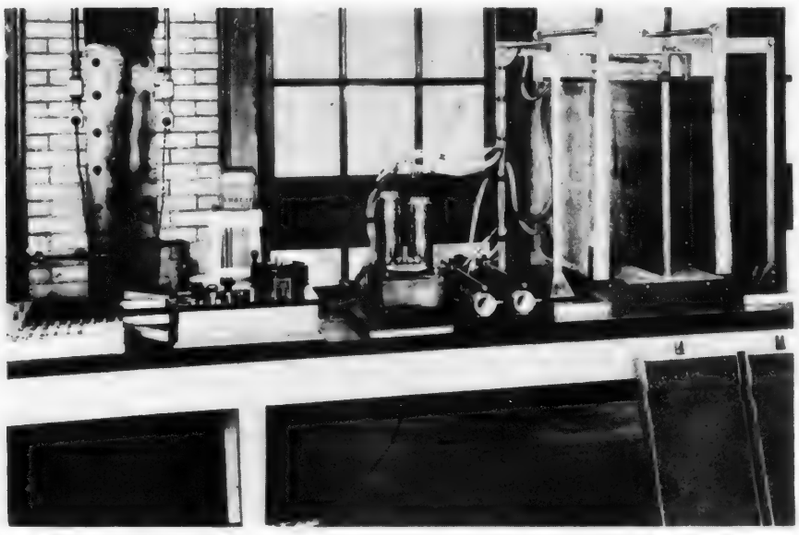
At Carnegie Institute of Technology, cooperative research is conducted on the flow of steam and condensation-water in pipes. This is fascinating work, profound in the possible economic results. The results have shown that it is possible to reduce the sizes of pipes for given duties, with tremendous savings in cost to building owners. This work will continue indefinitely.

At the Texas Agricultural and Mechanical College, at Austin, Tex., similar work is being conducted directly under Professor Giesecke, a national authority, on hot water heating pipe sizes and arrangements.

At Pittsburgh, at the Bureau of Mines, we have two psychrometric chambers,



Elevation of Radiator Test Plant at Purdue University



New 24-In. Hot Plate and Control Apparatus Used at University of Minnesota for Determining Heat Transmission Through Lumber

where controlled atmospheric conditions are available. We are equipped with the necessary instruments and facilities to study the effect on human beings of the varied atmospheric conditions encountered in industry, as in steel mills, theatres or places of assembly.

Our study in the psychrometric room covering heat production in and dissipation from the human body has extended over many years' work. It has involved a study of the rate of metabolism and required the development of apparatus for measuring the heat outgo from the lungs as well as that from the skin. The study is of profound value in all mancooling projects. Many reports have been published covering the results of this research. We did not discover that there is a certain temperature and moisture condition above or below which the metabolism rate increases, but it is in any event an interesting thing to know. When the surrounding air is too cool the heat production in the body speeds up to compensate. When the surrounding air is too warm the heat production in the body speeds up to enable the body to get cool because of greater heat given off as by evaporation of perspiration. We are now publishing data dealing with the bodily heat-controlling mechanism, the results of a year's observation in these test rooms.

The results of this research, on which perhaps more time and resources have been spent than on any other of our studies, are classical, involving participation in the well-known Comfort Zone Chart of the American Society of Heating and Ventilating Engineers, and covering fundamentals which are of almost inestimable value in all projects involving the promotion, by air conditioning, of human comfort and well being.

District Heating School at Purdue University

A course of study in district heating will be offered by the National District Heating Association in cooperation with Purdue University, Lafayette, Ind., May 20-24, inclusive. This year only one course will be given, similar to Course II of last year. In 1928, sixty men attended this school and it is expected that the attendance this year will be well over that number.

The lectures will be given by members of the university staff and by representatives of various district heating companies. Among the subjects which will be taken up are accessory apparatus for district heating, principles governing the flow of heating in pipes, design and construction of underground distribution structures, heat losses from the distribution system, welding, methods of estimating heat consumption, and heat utilization.

Applicants for this course should have a trade or high school education but need not be college graduates. Membership in the N.D.H.A. is not required. The course will be in charge of Prof. C. H. B. Hotchkiss.

Cast-Iron Pipe Flanges and Flanged Fittings

A draft of the proposed standard for cast-iron pipe flanges and flanged fittings for maximum hydraulic working pressure of 800 lbs. per sq. in. at ordinary air temperature, is being circulated for criticism among the members of the sectional committee of the American Standards Association.

Dean Collins P. Bliss, of New York University, is chairman of the sectional committee which is under the joint sponsorship of the American Society of Mechanical Engineers, the Heating and Piping Contractors National Association, the Manufacturers Standardization Society of the Valve and Fitting Industry.

The draft, as submitted to the members of the American Standards Association, has the following introductory notes attached by A. C. Taylor, secretary of the committee:

"The committee recommended that a special sub-committee of the sectional committee be appointed to develop a rational system of marking for steel and cast-iron pipe flanges and fittings. The report of this special committee when finally approved would be inserted in the printed standard at the time of its first revision.

"Attention is also called to the statement that in the absence of a suitable American Society of Testing Materials Specification for Cast-Iron intended for use in Pipe Flanges and Fittings, that table 1, covering the minimum physical and chemical requirements, be used. This would permit the manufacturer to furnish a higher grade of material if he so desires."

Home Modernizing Campaign Instituted in Oklahoma

A campaign for the modernization of old homes is being carried on by the building and loan associations of Oklahoma during the months of March, April, May and June. There are 88 building and loan associations in Oklahoma, whose real estate loans total $100,000. A survey has been made to determine what properties need modernizing and repairing, and each association will urge its borrowers to modernize the homes which stand in need of such changes. Each association will offer to advance the money required to make such improvements, as well as furnish data, information, plans, specifications and cost estimates for such work.

Standard Year Book for 1929 compiled by the National Bureau of Standards, George K. Burgess, director, has been published by the Department of Commerce, Washington, D. C., and may be had for $1. The year book covers such subjects as the standardization of commercial weights and measures throughout the world; international, national and federal standardizing agencies; standardizing activities of technical societies and trade associations, and biography on standardization. It is the third year of issue.

American Society of Heating and Ventilating Engineers

Committee on Forthcoming Heating and Ventilating Exposition

An advisory committee to assist the management of the International Heating and Ventilating Exposition, to be held in Philadelphia in January, 1930, during the next annual meeting of the American Society of Heating and Ventilating Engineers, has been appointed by President Thornton Lewis. H. P. Gant, of Philadelphia, is chairman, and the other members are: E. B. Langenberg, St. Louis, Mo.; J. I. Lyle, Newark, N. J.; J. F. McIntire, Detroit, Mich.; F. R. Still, New York; H. L. Whitelaw, New York; E. K. Webster, Camden, N. J.; H. C. Murphy, Louisville, Ky.; A. S. Armagnac, New York; D. S. Boyden, Boston, Mass.; and A. C. Edgar, Philadelphia.

Research Committees Appointed for 1929

The following technical advisory committees were appointed at the annual meeting of the society at the Edgewater Beach Hotel, Chicago, to handle research problems during this year:

Temperature, humidity and air motion: W. H. Carrier, chairman; infiltration, G. L. Larson, chairman; heat transmission, A. P. Kratz; pipe sizes for heating systems, H. M. Hart, chairman; heating and ventilation in its relation to health and comfort, Philip Drinker, chairman; radiation, R. A. Wolff, chairman; garage ventilation, E. K. Campbell, chairman; air cleaning devices. F. B. Rowley, chairman; atmospheric dust and smoke, E. B. Langenberg, chairman; oil-burning devices, L. E. Seeley, chairman; effect of wind and weather conditions on the heating load, R. S. Franklin, chairman; unit heaters, D. E. French, chairman.

Preparations for Summer Meeting

M. Barry Watson, chairman of the meetings committee of the Ontario Chapter, is organizing his committee men to handle the entertainment features at the society's forthcoming semi-annual meeting in the Highlands of Ontario, at Bigwin Inn, Lake of Bays, June 26-28.

Sub-committee chairmen are: Entertainment, Arthur Leitch; reception. Melvern F. Thomas; finance, Arthur Dickie; transportation, E. B. Sheffield; publicity, Edward M. Dolan.

Bigwin Inn is located on an island "far from the madding crowd," as it involves a railway journey from Toronto to Huntsville, followed by a boat ride through the beautiful Fairyland Peninsula Lake and the Lake of Bays. However, the inn can be reached by automobile. In that case certain formalities are necessary at the point of entry in Canada and the required regulations will be supplied by the Ontario Chapter.

A committee composed of H. H. Angus, chairman, A. J. Nesbitt, and Prof. F. B. Rowley, has charge of the technical program.

New York Chapter

Eighty members and guests were present at the regular monthly meeting of the New York Chapter held at the Building Trades Employers Association Building, March 18.

William J. Olvany, chairman of the nominating committee, submitted to the chapter the list of nominees for the officers of the chapter for the coming year. The nominees are: President, E. J. Ritchie; vice-president, A. J. Offner; treasurer, F. E. W. Beebe; secretary, E. B. Johnson. Board of governors, H. B. Hedges, C. W. Brabbée and R. Donnelly.

A proposed bill to be acted on by the New York State Legislature for the licensing of steamfitters in New York state was read in full. Under this plan, all steamfitting installations in the State of New York must be made by licensed steamfitting contractors, who are to submit the plans for the proposed piping in the building to the Commissioner of Industry together with a $10 fee. The commissioner will examine these plans and, if approved, return them with a suitable certificate. No installation shall be made without approval of the plans.

A lively discussion took place during which Mr. Olvany told that this bill meant that every change in piping would require that plans be submitted to the commissioner at Albany before any work could be done on the building. In case of a breakdown requiring piping changes on a Saturday afternoon, it would be impossible to make the changes till the following week after the plans had been drawn up and approved. The same bill is of interest to consulting engineers who, if this bill were passed, would be required to submit all their plans for approval.

Mr. Offner and Doctor Adler, as consulting engineers representing the chapter, consented to appear before the legislature the next day to oppose the bill. A motion was passed that a telegram protesting adoption of the bill should be sent to Senator John W. Gates, chairman of the committee on labor and industry, and to Assemblyman Charles P. Miller, chairman of the committee on labor and industry. The telegram which was sent read: "The New York Chapter of the American Society of Heating and Ventilating Engineers in meeting assembled on March 18, hereby vigorously protests against the enactment of Section 1, Chapter 50, Laws 1921, as it is offered to amend them." This was signed by the New York Chapter of the American Society of Heating and Ventilating Engineers, H. Berkley Hedges, president.

"Recent Developments in House Heating by Gas" was the subject of a talk delivered by A. W. Pihlman, of the Consolidated Gas Company of New York.

Samuel R. Lewis

Seated at the desk presented to him by the chapters of the A.S.H. & V.E., in appreciation of his services as chairman of the society's Committee on Research during 1928.

Mr. Pihlman told of the rigid requirements of the American Gas Association when testing house-heating appliances, among these being one stating that the carbon monoxide in the flue gas shall not exceed .04%. This means that even if the flue were improperly connected and the flue gases should exhaust into the house, there would be no danger of asphyxiation. This standard is the same as that maintained in the Holland Tunnel.

Of particular interest to heating contractors is the fact that gas boiler ratings are stamped on the boiler or furnace in actual B.T.U. boiler output, and also in square feet of steam or water radiation at the boiler outlet. In other words, all the heating contractor has to do is add his piping and starting allowances to the actual connected radiation load to determine the rating of this boiler. The ratings are made on a gas pressure of 3½ in. water gauge at the house inlet. Mr. Pihlman recommended that the gas piping should be run full size when 50 ft. in length. If longer than this, it should be run one size larger.

Although a good chimney is not required to give good combustion in a gas boiler, the flue must be in good condition to prevent the damage arising from condensation. The hydrogen burning to water vapor makes necessary a flue gas temperature of not less than 130°, which is the dew point of an average flue gas.

Slides were shown of various types of gas-fired boilers, statistics and operating curves. A lively discussion on the subject of gas pressure, heat-loss calculations, rates, and methods of merchandising gas boilers concluded the meeting.

Illinois Chapter

A description of the installation and ventilation system in the House of Congress, Washington, D. C., was given by J. I. Lyle, past president of the society and treasurer and general manager of the Carrier Engineering Co., at the monthly meeting of the Illinois chapter, March 11, held at the Hotel Sherman, Chicago. Mr. Lyle told how, since 1851, there have been periodic attempts made to improve the air conditions in this building. In 1913, a cooling system was designed by a charter member of the Society and bids were taken but the work was never done. In recent years there has been so much discussion about the ventilation that a committee was finally appointed to determine just what air conditions should be maintained within these two chambers and to recommend the engineers for the design of the equipment. This committee included past president Fred R. Still, past president Arthur C. Willard, and past president Dwight D. Kimball. The committee concluded that the best results would be obtained by requiring the bidders to submit their own specifications and designs for examination by the committee.

With the aid of slides, Mr. Lyle then gave an extensive description of the system which was accepted by the committee, the method of its installation and operation.

After a discussion as to the best method of measuring air flow through grilles and the relative merits of existing practice in this matter, a motion was passed that the chairman appoint a committee of five members to make the necessary arrangements to have Prof. Lynn E. Davies, of the mechanical engineering department of Armour Institute of Technology, appear before the Illinois Chapter at the April meeting and inform the society of the results of his investigations and research on this subject.

Michigan Chapter

The Michigan Chapter held its monthly meeting in honor of President Thornton Lewis, March 11, at the Detroit Yacht Club, with 128 members and guests attending.

Business reports were omitted, and immediately after the dinner, President Rowe introduced Past President J. R. McColl. Mr. McColl devoted most of his talk to the semi-annual meeting to be held at Bigwin Inn, Lake of Bays, Ont.

President Rowe then introduced the national president, Thornton Lewis, who paid a warm tribute to the Michigan Chapter on its large turnout, and to the work which it is doing, particularly with reference to the limited chapter membership.

Mr. Lewis told of the work the society has done this year, mentioning the boiler code, and commented on the unit heater code and ventilation of garages, which will be taken up at the semi-annual meeting. The talk was closed with a plea to the members to interest younger men in the workings of the society and thereby build up a better society.

The members and guests then adjourned to the Sailor's Grill where unique entertainment had been arranged in the form of a Kentucky Derby. Much of the credit for the success of this good sport was due to the untiring efforts of President Rowe, William Boales, J. L. Fuller, William Whelan and E. E. Dubry.

Minnesota Chapter

F. C. Houghten, director of the Research Laboratory, Pittsburgh, delivered a talk before the Minnesota Chapter, in the Men's Union Building at the University of Minnesota, March 11. His subject was "The Work of the Research Laboratory and Its Influence on the Present Practice of the Heating and Ventilating Engineer."

Plumbing and Heating Industries Bureau to Get Financial Support

Voluntary contribution by individual members will be made to the bureau by the Indiana Society of Sanitary Engineers, as the result of action taken at the 33rd annual convention of the society in March. While certain members offered large donations, the minimum was set at two dollars.

This action was taken as an expression of confidence in the work which the bureau is doing for the local contractor.

Bulletin Circulation Restricted

Beginning with the May issue, the Plumbing and Heating Industries *Bulletin*, the bureau's monthly publication, will be sent only to members of the National Association of Master Plumbers, the Heating and Piping Contractors National Association and non-members who pay the regular subscription price for the magazine. This decision was taken out at an executive committee meeting of the bureau in Chicago, March 16. At the same meeting Gov. Walter J. Kohler of Wisconsin, presented his resignation as chairman of the committee, since his new duties have made it impossible for him to devote the necessary time to the work. He was succeeded by Jere Sheehan, Jr., president of the National Association of Master Plumbers. Herbert B. Kohler, brother of Governor Kohler, was elected a member of the executive committee. In connection with the program of the bureau it was stated that the present series of advertisements which the bureau has published completes the first cycle in its publicity program. The second cycle of thirteen advertisements will be inaugurated as soon as the necessary funds are available.

International Heater News for March, published by the International Heater Co., Utica, N. Y., contains descriptions of several heating installations using Economy boilers and furnaces. A new group of advertisements prepared by this company for its dealers is shown together with the cartoons which are used to illustrate them. These advertisements tell of the troubles of the Cold Family Robinson and their attempt to properly heat their home. Photographs of T. Reid Mackin, western sales manager, and R. L. Griffiths, credit manager of the company, together with short biographical outlines, also are presented in this issue.

CAPACITY OF ORIFICES IN GAS APPLIANCES

(Concluded from Data Sheet No. 50-I)

Diameter, Inches		Area	Morse Drill Gage Size	Cubic Feet per Hour		
Frac.	Decimal	Square Inch		Coal Gas, 0.43 sp. gr. 2" Press	Water Gas, 0.62 sp. gr. 2" Press	Natural Gas 0.62 sp. gr. 4½-oz Press
39/64	0.6094	0.2917	.....	376	313	610
5/8	0.625	0.3068	.....	387	323	630
41/64	0.6406	0.3223	.....	399	333	650
21/32	0.6563	0.3382	.....	410	341	665
43/64	0.6719	0.3546	.....	421	350	682
11/16	0.6875	0.3712	.....	431	369	720
45/64	0.7031	0.3883	.....	443	370	722
23/32	0.7187	0.4057	.....	454	378	737
47/64	0.7344	0.4236	.....	466	387	755
3/4	0.750	0.4418	.....	476	397	774
49/64	0.7656	0.4604	.....	488	406	792
25/32	0.7812	0.4794	.....	499	415	810
51/64	0.7969	0.4988	.....	510	424	827
13/16	0 8125	0.5185	.....	520	433	845
53/64	0.8281	0.5386	.....	532	443	865
27/32	0.8438	0.5591	.....	543	453	884
55/64	0.8594	0.5801	.....	554	461	900
7/8	0.875	0.6013	.....	565	472	920
57/64	0.8906	0.6229	.....	576	480	938
29/32	0.9062	0.6450	.....	588	490	955
59/64	0.9219	0.6675	.....	599	500	976
15/16	0.9375	0.6903	.....	610	507	985
61/64	0.9531	0.7134	.....	620	517	1010
31/32	0.9687	0.7371	.....	632	526	1025
63/64	0.9844	0.7611	.....	644	536	1047
1	1.0000	0.7854	.....	655	545	1062

NOTE: The tables on Data Sheets Nos. 50-H, 50-I and 50-J are based upon data obtained from gas orifices that ordinarily are used in gas appliances.

Artificial Gas—The above figures are based upon 2-in. pressure; for higher pressures these figures should be increased by a percentage as shown below:

Per cent	Per cent
3-in. = 25	10-in. = 120
4-in. = 50	12-in. = 140
5-in. = 62.5	16-in. = 180
6-in. = 75	20-in. = 210
7-in. = 87.5	

Natural Gas—The figures for natural gas are based on a gas under 4½-oz. pressure having a specific gravity of 0.62, which is the ordinary gravity of natural gas sold in cities supplied by gas from the mid-continent, Pennsylvania and West Virginia fields. When the pressure is greater than 4½-oz. the figures in the tables should be increased as shown below:

Per cent	Per cent
5-oz. = 10	8-oz. = 39
6-oz. = 20	9-oz. = 47.5
7-oz. = 30	10-oz. = 60

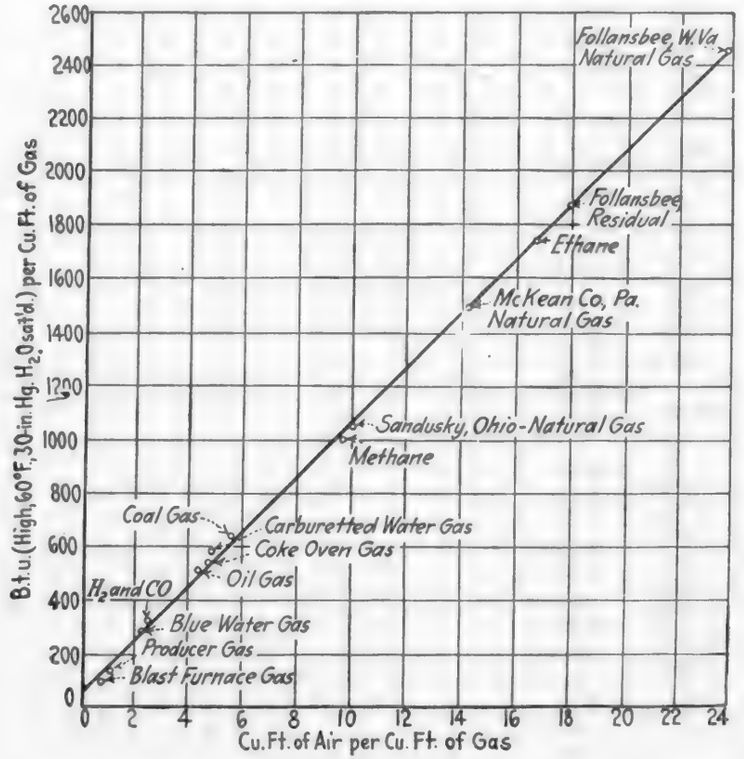
From "Handbook of Petroleum, Asphalt and Natural Gas," published by Kansas City Testing Laboratory.

AIR REQUIRED FOR GAS COMBUSTION

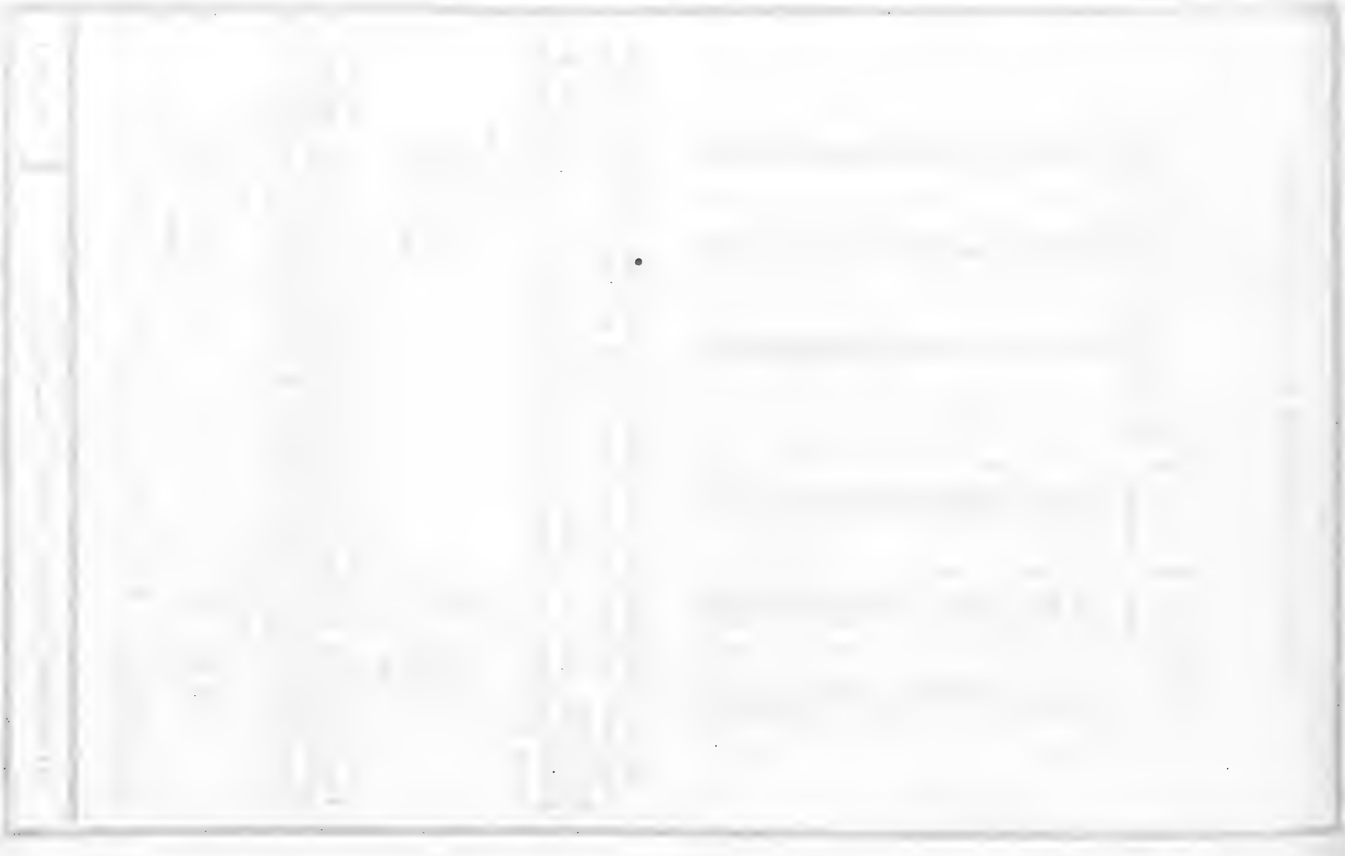
In this chart the number of cubic feet of air theoretically required for the combustion of 1 cu. ft. of gas is plotted against the gross heat content of the various combustible gases and the resulting curve is a fairly straight line.

Although not strictly correct in the case of the unsaturated hydrocarbons, nevertheless, this curve affords a simple and fairly accurate method for determining the amount of air required for combustion from a knowledge of the B.T.U. content of the combustible gas. The equation of this line is

$$\text{Cubic feet of air required to burn 1 cu. ft. of gas} = \frac{(\text{B.T.U.})^{1.00} - 52}{100}$$



From "Fuels and Their Combustion," by Haslam and Russell, published by McGraw-Hill Book Co., Inc.



Selecting and Operating Laundry, Kitchen and Hospital Equipment

Part III—Hospital Equipment

By H. C. Russell

From a paper presented at the annual meeting of the American Society of Heating and Ventilating Engineers, in Chicago, January 28-31, 1929.

EVERY hospital must sterilize all instruments and utensils used in operations and treatments, as well as all dressings before being used, bedpans and babies' milk and bottles. There must also be provision for the sterilizing of mattresses and dishes. All of which makes it necessary that a plentiful supply of sterilized water and distilled water be at hand at all times.

Instrument, dressing, utensil, dish and mattress sterilizers are usually rated by their internal dimensions in inches; water sterilizers by the gallon capacity of each of the two reservoirs, water stills by their capacity in gallons, and pasteurizers, as well as bottle sterilizers, by their capacity in 8-oz. bottles.

Selection of Sterilizers

Sterilizers and water stills may be had which are heated by steam, electricity, gas, kerosene or gasoline, the preference being in the order named. Steam is the only method, however, for which the entire line of sterilizers ordinarily is made.

A steam-heated sterilizer may operate dry indefinitely without any injury resulting, but this is not the case when other systems are used. Those which are electric should have equipment in order to protect them against low water and over-pressure. When heated by gas, kerosene or gasoline, there should, at times, be devices for protection against pressure but not against low water. Difficulty often arises on account of the derangement to which such devices always are liable.

Electricity is superior to any other method only in the case of the solution warmer, where, due to its adaptability to automatic control, it is preferable.

The cost of operation of steam sterilizer equipment is very little more than the cost of keeping steam constantly available and the amount of use has little effect on the total cost of operation.

In the open type of sterilizer, the articles are immersed in a water bath heated by steam coils, the limited temperature being 212° F. With the closed type, there is no water bath and the articles are brought into temperatures corresponding to steam at 40 to 60 lbs. pressure per sq. in.

The former type, although in use for a longer time, has the disadvantage of depositing lime or other impurities from the water on instruments, sometimes requiring them to be dried before storing.

Better sterilization is provided by the latter and newer type, and articles are dry when removed from it. Sterilizers of this kind must be used for dressings and fabrics.

Built-in Sterilizers

There is a growing tendency to use the built-in sterilizers in operating suites and other places where they are installed at one point. Only pressure type sterilizers which are loaded and unloaded from one end are adaptable to this arrangement. With this method, a thin partition is built flush with the sterilizer fronts with only the doors, gages and operating valves visible in the rooms, the bodies projecting into an unfinished space behind the partition, the latter being accessible for repairs.

Proportioning Equipment

Requirements in different hospitals vary so widely that it is difficult to state just what number and size of sterilizers should be installed. The suggestions given in this article are for what are considered ordinary conditions.

One 16-in. by 24-in. dressing sterilizer will care for two major operating rooms, possibly three, but for more than two such rooms, it is better to provide a 16-in. by 36-in. size or, to install two 16-in. by 24-in. sterilizers.

One 20-in. by 20-in. by 24-in. open-type utensil sterilizer will care for two major operating rooms unless the work is very heavy.

A 9-in. by 10-in. by 20-in. open-type instrument sterilizer should be provided for each major operating room, although one 10-in. by 12-in. by 22-in. may serve two such rooms. The 12-in. by 16-in. by 24-in. instrument sterilizer finds its use where it is convenient to sterilize from three or more major operating rooms at one place. A 14-in. by 22-in. pressure-type instrument sterilizer easily will serve two major operating rooms.

Water sterilizers usually consist of twin reservoirs of the same capacity mounted on one frame, one being for water kept hot by steam coil in the reservoir, and the other cooled by circulating cold water through a coil in the reservoir. Both, of course, sterilize their contents.

Water stills are part of the water-sterilizing unit, consisting of still and reservoir, generally being mounted between the two water reservoirs.

Water sterilizers are available in sizes from 6 to 100-gal. capacity of each reservoir and stills in capacities of 1, 3 and 6-gal. reservoir capacity. The total capacity of the two reservoirs in the water sterilizer should range between 5 and 10 gal. per major operation per day.

The 3-gal. still would suffice for hospitals up to 100 beds and the 6-gal. size should be used for larger ones in connection with the water sterilizers.

Stills of the same capacity are obtainable which are separate from the water sterilizers, and they are frequently needed in the maternity department.

The dressing, instrument and utensil sterilizers are primarily for the major operating rooms, and should be in or adjacent to them. Where the operating rooms are scattered, all sterilizers with the exception of that used for dressings, should be duplicated for each location. Where built-in sterilizers are used, the fronts may open directly into the operating rooms, or when a single sterilizer installation is used for more than one operating room, it should be located in a separate room between them.

Uncontrolled sources of heat, however small, should be avoided as much as possible in an operating room. In hot countries this is very important, for oscillating fans usually are not allowable in such rooms. In each minor operating room, such as for eye, ear, nose

and throat, and in the dental clinic, a small electric sterilizer, usually about 5 in. by 6 in. by 16 in. for instruments should be provided. These are made with brackets for wall mounting.

In the surgery and maternity departments and at convenient locations to rooms and wards, blanket and solution warmers should be placed; these being available in sizes about 18 in. by 24 in. by 72 in., and 18 in. by 30 in. by 72 in., simply heated and divided into compartments. For wards and rooms they should be placed in or near the utility rooms.

A surgical dressing room may use the equipment of the main sterilizing room if adjacent to it, but if this is not possible, separate equipment should be provided. A 6-gal. water sterilizer, one 8-in. by 9-in. by 18-in. instrument sterilizer and a 16-in. by 15-in. by 20-in. utensil sterilizer will usually suffice for a small hospital.

In the laboratory there should be installed an autoclave, which is a dressing sterilizer without the jacket, for the wet sterilizing of material. A 16-in. by 24-in. size will be large enough for a 100-bed hospital, although two larger sizes are available which are 18 in. by 26 in. and 22 in. by 30 in.

Utility Rooms

These should be provided on each floor and should contain, in addition to combination sink and tray, one 20 in. by 24 in. and one bed-pan sterilizer. Utility rooms serving surgical and maternity patients also should contain an 8-in. by 9-in. by 18-in. instrument sterilizer and a 10 to 15-gal. water sterilizer.

Equipment for pasteurizing milk and sterilizing bottles must be provided in the nursery. These may be combined in a small hospital, but in a large one, this method is not satisfactory. Pasteurizers can be had in 54, 72, 144 and 288-bottle capacity, 8-oz. nursing bottles. About 1 hr. is required for a cycle, as laws frequently require that the pasteurizing process consume 30 min. When bottle sterilizing is done separately, a pressure-type sterilizer for nursing bottles is provided.

Dish Sterilization

Where there are contagious diseases, dishes may be sterilized in special dish-washing machines or, on a small scale, in a 20-in. by 20-in. by 24-in. utensil sterilizer.

Every hospital should be provided with a mattress sterilizer. Although the smaller ones may be purchased which are arranged for gas or electric heating, mattress sterilizers are practicable only when heated with steam. The large size, 36 in. by 42 in. by 84 in., is the most widely used, and may be charged at one end and discharged at the other, thus offering the advantage of placing it in a partition between two rooms and effecting a complete separation of sterilized and unsterilized material.

Different manufacturers have sizes of sterilizers which are approximately the same but not absolutely standardized as to sizes. Hence, it is advisable to give inside dimensions and minimum capacity in cubic inches when specifying sizes.

Piping for Sterilizers

Steam and return pipe sizes for sterilizers are almost nominal, the amount of steam used being small when drawn from a central plant for heating. A ½-in. supply and return connection is ample for any utensil instrument or dressing sterilizer. Water sterilizers up to 15 gal. require ¾-in. supply and ½-in. return; above that size, 1-in. supply and ½-in. return. For large mattress sterilizers, 1¼-in. supply and ¾-in. return connections may be used, while water stills up to 6 gal. use ½-in. supply and return pipes.

It is a uniform practice to provide a thermostatic trap on the return from each coil or unit of the same size given above for return connection. The return main should be vented and condensation should return by gravity to a vented receiving tank.

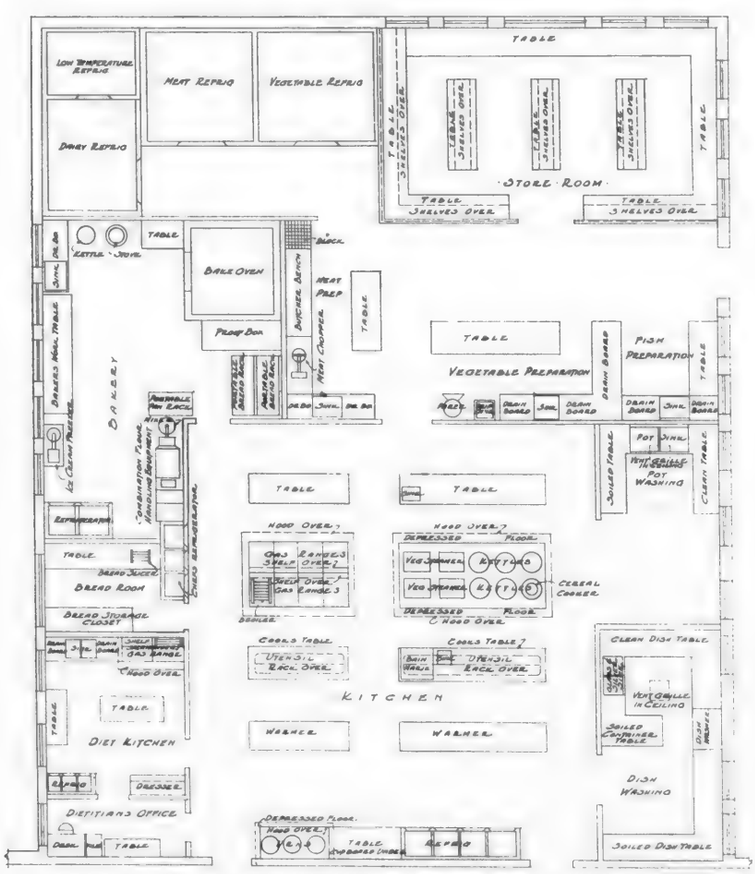
All open-type sterilizers must have waste connections similar to plumbing fixtures. Traps on these waste lines must be provided in the case of each kind of sterilizer except that of the bedpan. The waste connections are seldom more than ¾ in. at the fixture, although they are 3 in. for bedpan sterilizers. Such waste should be connected to the drainage system.

Vent connections also are necessary on such sterilizers in order to do away with steam and vapor.

The usual sizes of combination overflow and vent connections to open sterilizers are as follows: Utensil 1¼ in. up to 16-in. by 15-in. by 20-in. size, and 2 in. for larger sizes; instrument 1¼ in. for all sizes; milk pasteurizers and sterilizers 1¼ in. up to 72-bottle size and 2 in. for those larger; bedpan sterilizers 2 in. Vents to atmosphere are the same size as combination overflow and vent.

Where practicable, it is well to run the vents from sterilizers through the roof separate from other plumbing vent lines and to make them of extra-heavy pipe, for the large amount of condensation in them often destroys standard-weight piping in the smaller sizes rather quickly. A 2-in. vent line will carry a half-dozen sterilizers, but in cold climates, it should be at least 4 in. through the roof in order to prevent frosting over.

Care must be taken that the bases of vent lines from such equipment are drained through a trap into the waste lines of the plumbing system so that



Dining Rooms for Nursing Staff and Help Located Elsewhere

there will be no draining back into the sterilizers.

Closed or pressure-type sterilizers require a vent to atmosphere which is connected to the chamber and provided with a valve. The relief valve, with which every closed sterilizer must be provided, usually is connected to this vent line on the line side of the valve. These vents are usually ¾ in. from each sterilizer.

Frequently, both open and closed sterilizers of all types, are provided with condenser exhausts, consisting of a special ejector, manipulated by a valve and throwing a stream of cold water into the ejector. The condenser exhaust is a part of the fixture, when used, and generally wastes over an open funnel leading to the plumbing system waste.

A furred space in the walls behind the fixtures for the pipes and connections usually should be provided on account of there being so many connections to sterilizer equipment. Although connections may be made to the floor, for sanitary reasons it is better to make them to the wall. Built-in sterilizers, of course, avoid the necessity of having the false partition. In order to facilitate the cleaning of equipment, it is advisable to place the traps at the bottom of vents, in order that cleanouts will be accessible from the basement ceiling.

Sterilizer Data

Data on sterilizers of various types and sizes are given in the table, although it must be remembered that the standards of different manufacturers, dimensions of sterilizers and capacity in cubic inches vary. In layouts for electric sterilizers, the actual requirements must always be investigated, otherwise, much difficulty might result.

This type of equipment generally is considered essential in psychiatric hospitals and consists of one set of fixtures unless the hospital is very large. In the set are included supplies for needle shower and rose spray, perineal stool and sitz bath with liver spray and one control table. The maximum momentary use of water for outfit amounts to about 40 gal. of cold water and 20 gal. of hot water per minute.

Incinerators

For the destruction of soiled dressings and other refuse, one of the many types of steel or cast-iron garbage burners may be installed near the boiler room. Such incinerators also are constructed of brick or masonry.

With all types a supplementary fire must be maintained whenever the incinerator is in operation. They must be equipped with two separate grates or two sections of the same grate, so that refuse to be burned is not mixed with the fire maintained. When arranged for heating water, they are quite satisfactory for use when refuse is not being burned.

Incinerators for destruction of garbage in the basement are not recommended. The incinerators used in a number of United States public health hospitals, are constructed for one ton per day and preferably are used out of doors, but they can be made adaptable for nearly any condition.

When boilers are located in a separate building, the incinerator frequently is placed there and so arranged as to be charged from a platform outside the boiler house but fired from inside. Thus the care of it is placed in the proper hands, and the smoke pipe can be connected to the main chimney, eliminating, in this way, the principal objection to locating the incinerator near an inhabited building.

Size in In.	Internal Capacity Cu. In.	Lbs. of Steam per Sterilization	Watts Required in Wiring
	Cylindrical dressing sterilizers		
10 x 20	1,571	10	4,000
12 x 20	2,260	12	6,000
14 x 22	3,388	14	6,000
16 x 24	4,824	18	6,000
16 x 36	7,236	24	6,000
16 x 48	9,648	31	12,000
16 x 60	12,060	39	12,000
20 x 28	8,792	30	12,000
20 x 36	11,304	37	12,000
20 x 48	15,072	47	12,000
	Rectangular dressing sterilizers		
24 x 24 x 36	20,736 Approx.	55	Not standard
24 x 24 x 48	27,648 Approx.	70	Not standard
24 x 24 x 60	34,560 Approx.	88	Not standard
	Open-type utensil sterilizers		
16 x 15 x 20	4,800	30	4,400
20 x 20 x 24	9,600	50	6,600
	Open-type instrument sterilizers		
8 x 9 x 18	1,296	6	2,200
9 x 10 x 20	1,800	8	2,200
10 x 12 x 22	2,640	10	4,400
12 x 16 x 24	4,608	16	4,400
Water sterilizers. (Steam and watts are for each reservoir.)			
6 gal.		15	3,000
10 gal.		25	6,000
15 gal.		37½	6,000
20 gal.		50	12,000
25 gal.		62½	12,000
35 gal.		87½	18,000
50 gal.		125	24,000

Record First Quarter for Fan Manufacturers

A heavy demand for air conditioning and ventilating equipment for industrial and public buildings is bringing a record first quarter to the fan manufacturers, according to a report by C. A. Booth, vice-president of the National Association of Fan Manufacturers.

Mechanical facilities for controlling air conditions are becoming increasingly popular in manufacturing and industrial plants for the protection of the workers in industry and for reducing production costs in manufacturing. Mr. Booth stated that a careful checking of the fan and blower business gives him reason to believe that business generally this year will run at least 10% ahead of 1928. A survey of the business situation indicates that there will be considerably more activity in the building of factories this year but that activity in other building lines may be lessened somewhat.

The survey of fan manufacturing included reports from the American Blower Corporation, Buffalo Forge Company, B. F. Sturtevant Company, Bailey Blower Company, Ilg Electric Ventilator Company, Garden City Fan Company, and the New York Blower Company.

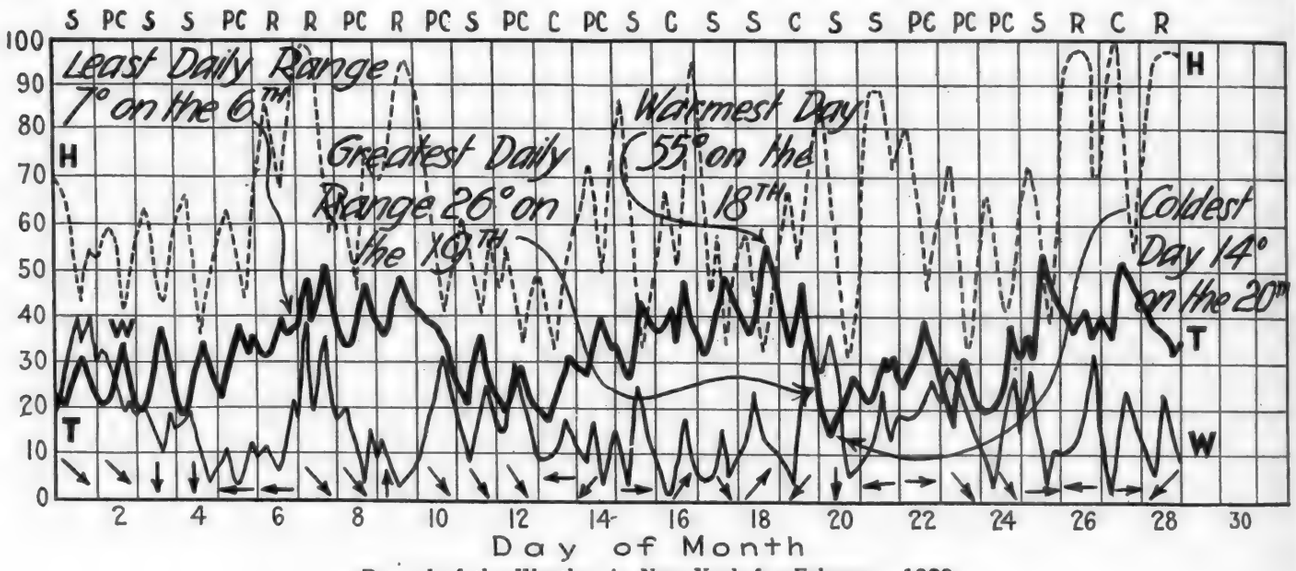
New Insulating Boards To Be Made of Hardwood

Work has been started on a plant in Greenville, Miss., for the production of a new insulating board which is to be made entirely of hardwood. The Southern hardwood used in the fabrication of this insulating board is chipped into small pieces and then mixed with water and chemicals which separate and cleanse the fibres. It is then poured onto a revolving cylindrical screen which removes a large amount of water and carries the moist fibrous mass, through a forming machine, to the gas heated apparatus, which removes the remaining moisture through evaporation.

Production of this insulating board will start in September at a rate which calls for a yearly output of 75,000,000 sq. ft. It will be manufactured by the Chicago Mill and Lumber Corporation.

The Weather for February, 1929

	New York	Boston	Pittsburgh	Chicago	St. Louis
Highest temperature, degrees F.	55	56	58	47	58
Date of highest temperature	18	18	26	26	24
Lowest temperature, degrees F.	14	14	3	—2	4
Date of lowest temperature	20	24	20	1	9
Greatest daily range, degrees F.	26	21	20	25	28
Date of greatest daily range	19	19	23	23	23
Least daily range, degrees F.	7	6	4	22	5
Date of least daily range	6	14	14	7	4
Mean temperature for month, degrees F.	33.4	31.7	28.6	21.6	28.8
Normal mean temp. for month, degrees F.	31.3	28.9	32.3	26.3	34.8
Total precipitation, this month, inches	4.30	3.78	2.62	0.54	0.88
Total snowfall, this month, inches	9.0	21.4	10.0	8.6	5.7
Normal precipitation, this month, inches	3.82	3.37	2.62	2.14	2.56
Total wind movement, this month, miles	9,516	5,584	5,977	5,653	6,122
Average hourly wind velocity, miles	14.2	8.3	8.9	8.4	9.1
Prevailing direction of wind	N.W.	N.W.	W.	W.	N.W.
Number of clear days	8	11	2	5	8
Number of partly cloudy days	10	7	7	8	8
Number of cloudy days	10	10	19	15	12
Number of days with precipitation	7	12	9	11	10
Number of days with snowfall	3	7	8	9	8
Snow on ground at end of month	None	3.7	0.5	None	None


S PC S S PC R R PC R PC S PC C PC S C S S C S S PC PC PC S R C R
Least Daily Range 7° on the 6TH
Greatest Daily Range 26° on the 19TH
Warmest Day (55° on the 18TH
Coldest Day 14° on the 20TH
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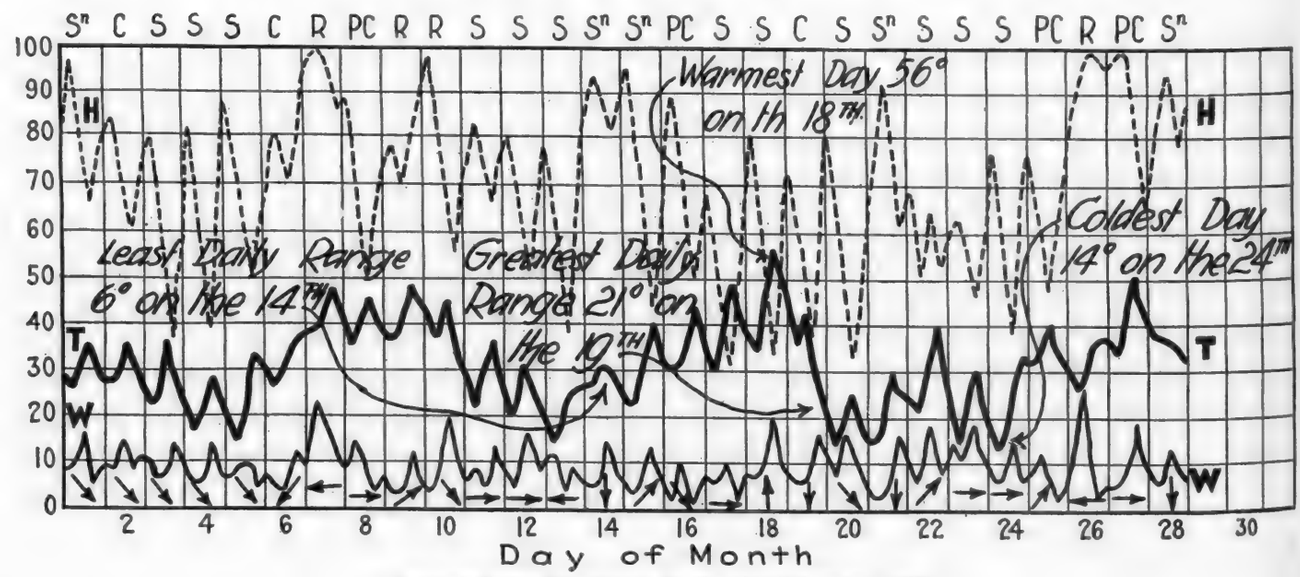
0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Record of the Weather in New York for February, 1929

(Hourly Observations of the Relative Humidity Plotted on this Chart)


Sn C S S S C R PC R R S S S Sn Sn PC S S C S Sn S S S PC R PC Sn
Warmest Day 56° on th 18TH
Least Daily Range 6° on the 14TH
Greatest Daily Range 21° on the 19TH
Coldest Day 14° on the 24TH
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50
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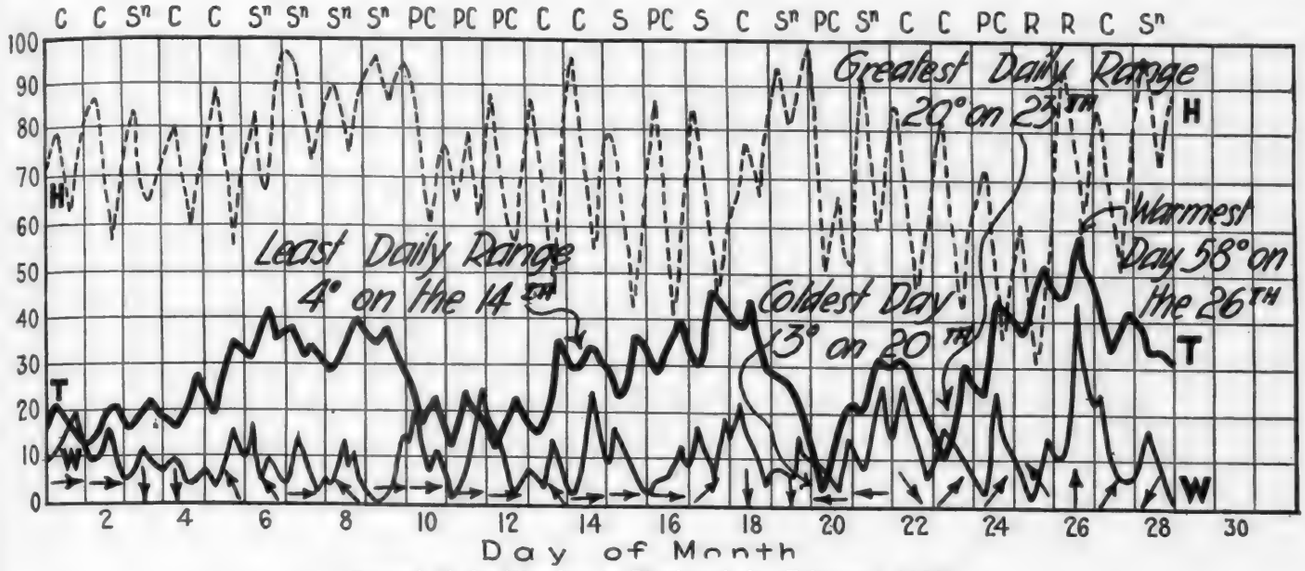
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Record of the Weather in Boston for February, 1929


C C Sn C C Sn Sn Sn Sn PC PC PC C C S PC S C Sn PC Sn C C PC R R C Sn
Greatest Daily Range 20° on 23RD
Warmest Day 58° on the 26TH
Least Daily Range 4° on the 14TH
Coldest Day 3° on 20TH
H
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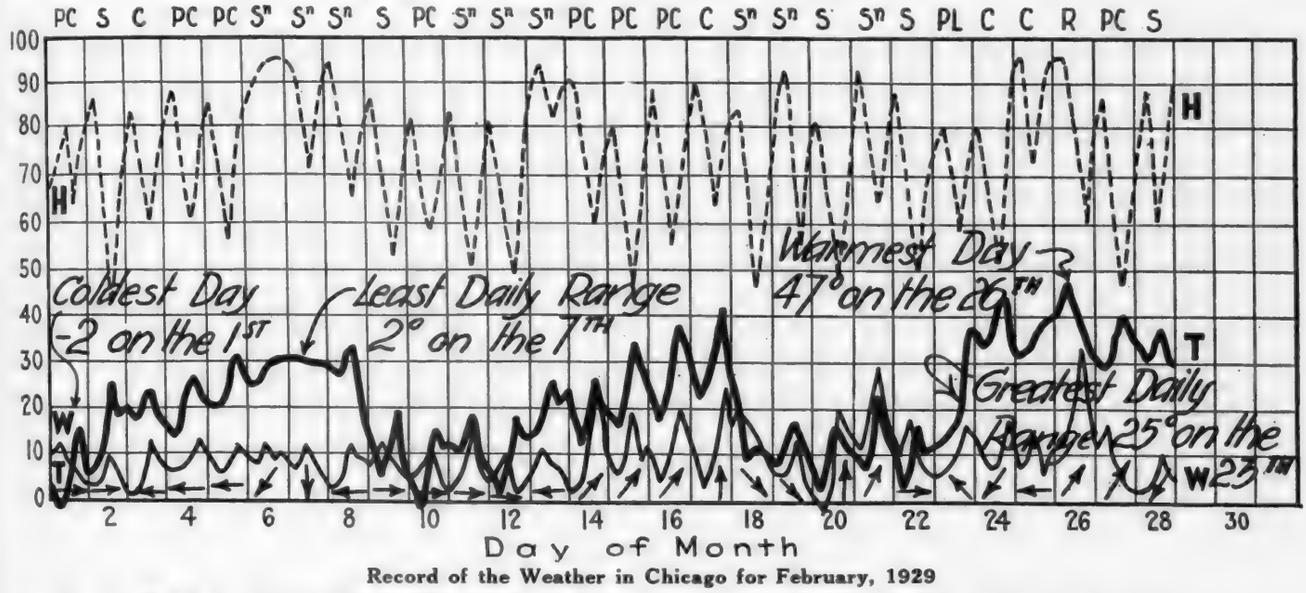
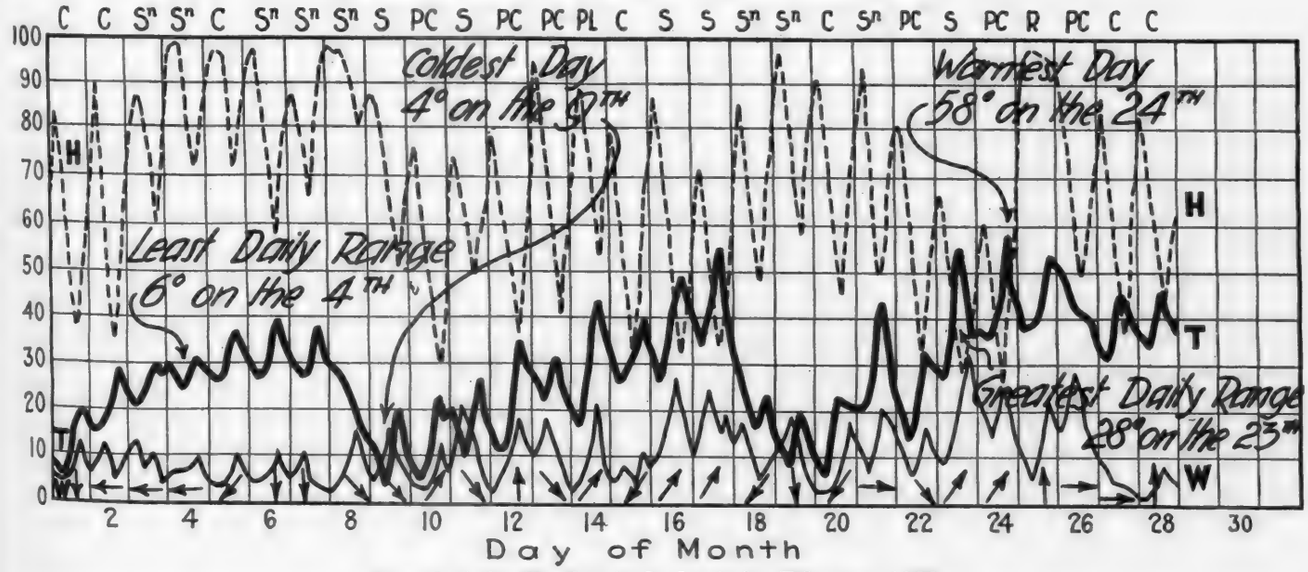
W
Day of Month

Record of the Weather in Pittsburgh for February, 1929


PC S C PC PC Sn Sn Sn S PC Sn Sn Sn PC PC PC C Sn Sn S Sn S PL C C R PC S
Coldest Day -2 on the 1ST
Least Daily Range 2° on the 7TH
Warmest Day 47° on the 26TH
Greatest Daily Range 25° on the 23RD
H
T
W
Day of Month

Record of the Weather in Chicago for February, 1929


C C Sn Sn C Sn Sn Sn S PC S PC PC PL C S S Sn Sn C Sn PC S PC R PC C C
Coldest Day 4° on the 9TH
Warmest Day 58° on the 24TH
Least Daily Range 6° on the 4TH
Greatest Daily Range 28° on the 23RD
H
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Day of Month

Record of the Weather in St. Louis for February, 1929

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE by the United States Weather Bureau.
Heavy lines indicate temperatures in degree F. Light lines indicate wind in miles per hour.
Broken lines indicate humidity in percentage from readings at 8 A.M., 12 M., and 8 P.M.
C—clear, PC—partly cloudy, C—cloudy, R—rain, Sn—snow. Arrows fly with prevailing directions of wind.

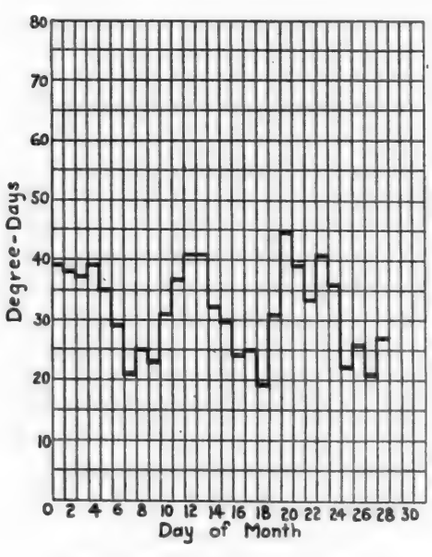
Monthly Heating Load in Degree-Days in Nine Typical Cities

DEGREE-DAY charts for representative cities in the United States are presented for use by heating contractors, house-heating managers of gas companies, heating appliance salesmen, and others interested in fuel consumption. At the end of the season these graphs can be pasted together and the heating load will be represented by a continuous line for the season.

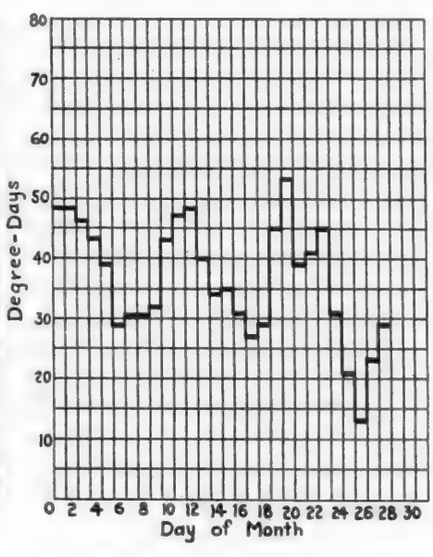
The degree-day is a unit coined by the American Gas Association and is the product of 1° in temperature and 1 day. When the average daily temperature falls below 65° the heating load is proportional to the difference between the daily temperature and 65°, and the number obtained represents the number of degree-days for that day.

When the average daily temperature is 54°, for example, the number of degree-days for that day is (65-54) or 11. When the average temperature is 40°, the degree-days total 25.

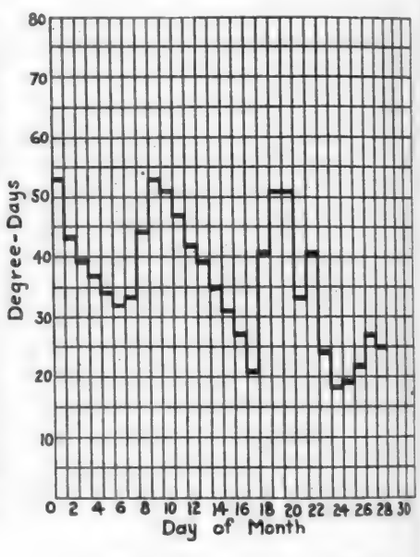
The total number of degree-days for a given month when divided by the yearly total will give the percentage of heat demand for that particular month. Unit fuel consumption figures, in quantities of fuel per degree-day per square foot of radiation or per square inch of leader pipe, are available for different fuels, different types of heating systems and for various grades of fuels, so that fuel consumption problems can readily be solved by applying degree-day data.



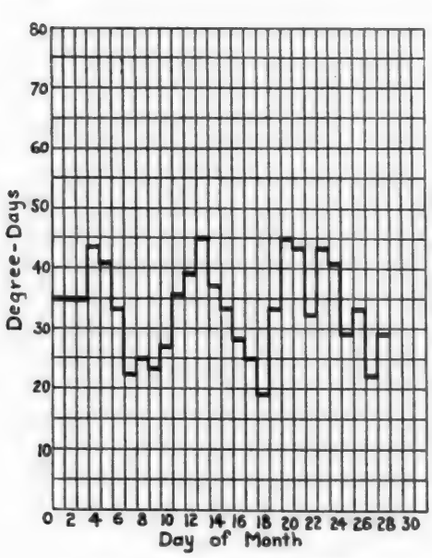
New York, February, 1929
Degree-Days 887—Degree-Days to Date 3613



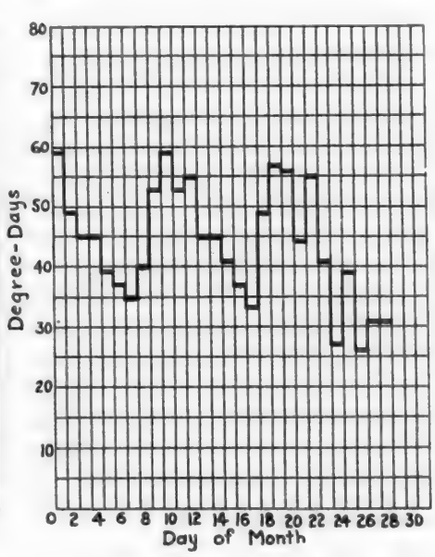
Pittsburgh, February, 1929
Degree-Days 1021—Degree-Days to Date 4169



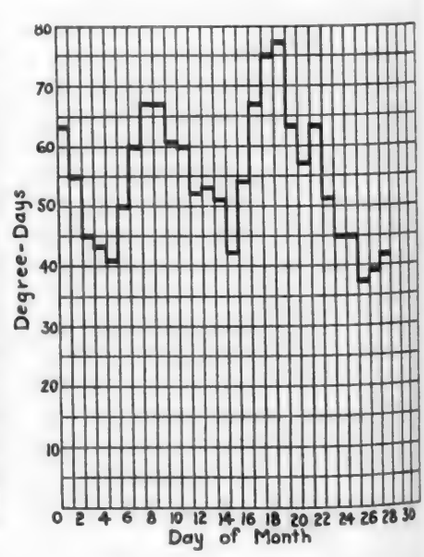
St. Louis, February, 1929
Degree-Days 1013—Degree-Days to Date 3814



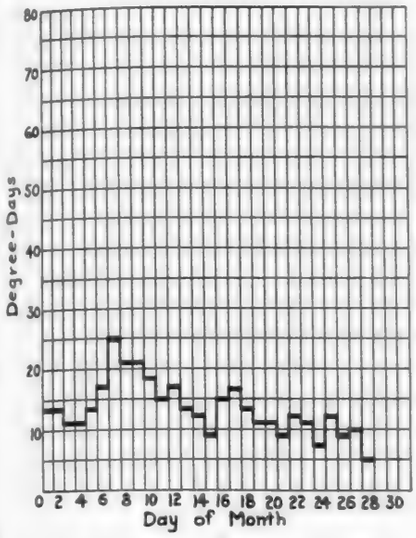
Boston, February, 1929
Degree-Days 932—Degree-Days to Date 3897



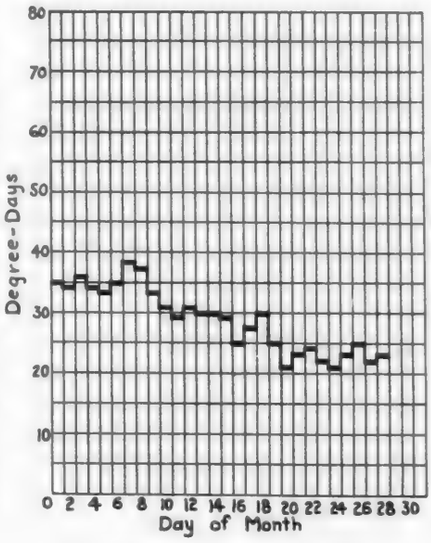
Chicago, February, 1929
Degree-Days 1226—Degree-Days to Date 4870



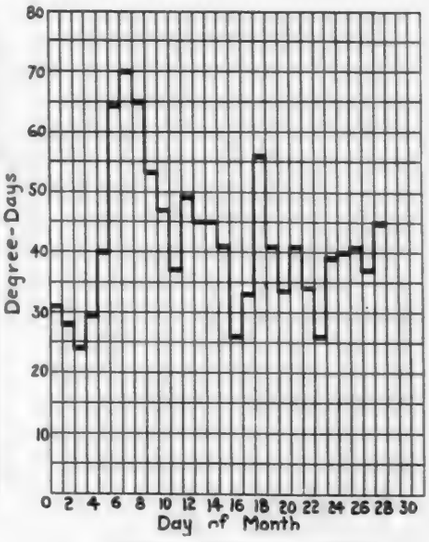
Minneapolis, February, 1929
Degree-Days 1520—Degree-Days to Date 6213



San Francisco, February, 1929
Degree-Days 360—Degree-Days to Date 1988



Seatttle, February, 1929
Degree-Days 806—Degree-Days to Date 3629



Denver, February, 1929
Degree-Days 1161—Degree-Days to Date 4700

Heating and Piping Contractors National Association

St. Louis Association Appoints Local Convention Committee

The Heating and Piping Contractors St. Louis Association has announced the appointment of its convention committee, which will have charge of the local arrangements for the Fortieth Annual Convention of the National Association, to be held at the New Jefferson Hotel, St. Louis, June 10-13.

Personnel of the committee is: Chairman, J. Lawrence DeNeille; treasurer, H. P. Materne; W. M. Smith, V. L. Sheldon, T. J. Lahey, Clem Chuse, W. C. Sodemann, Fred L. English, T. R. Taylor, T. J. Hester, James Moffitt, H. Balsinger and J. Dougherty.

New York State Heating Contractors Hold Convention

William J. Olvany, of New York, was elected president of the Heating and Piping Contractors New York State Association at the annual convention held in the Colonial room, Hotel McAlpin, New York, March 11-12.

Among the features of the meeting was an address by Stephen I. Miller, educational secretary of the National Association of Credit Men, who stated that it is too easy for men to get into business. This situation he changed partly to the liberality of credit managers. Mr. Miller urged the members of the association to merchandise their skill and experience in selling heating and piping jobs. Joseph C. Fitts, assistant secretary of the Heating and Piping Contractors National Association, spoke at some length on the subject of Certified Heating.

Unfair trade practices, direct selling, and methods of distribution were discussed in a talk by Russell G. Creviston, general manager of the Plumbing and Heating Industries Bureau, of Chicago. On the second day, Harold Thompson, New York manager for the Oster Mfg. Co., opened the session with a talk on the subject "Getting Something Out of an Association."

The convention ended with the annual banquet at which John Howell, industrial economist, was the guest speaker.

Welding Discussed by Heating Contractors

At the February meeting of the Heating and Piping Contractors New York City Association, John H. Zink of Baltimore, chairman of the Subcommittee on Welding of the Heating and Piping Contractors National Association, told of the work his committee is doing in standardizing methods and material for welding pipe.

The committee is at present working on standard specifications for welding and is working with the manufacturers of materials to develop material especially fitted for welded installations. Another project is a manual for the heating contractor which will contain all the information the heating and piping contractor will need in beginning and carrying on the business of pipe welding. Through the efforts of this committee the Plumbing and Heating Industries Bureau has undertaken the preparation of a text book for the use of learners of the art of pipe welding.

Mr. Zink, who illustrated his talk with lantern slides, told how welding could be used to solve construction problems that contain great difficulties where screwed fittings are used.

Refrigerators and Radiators to Be Sold on Time

Commercial Credit Companies and the General Contract Purchase Corporation have announced new financing contracts covering refrigerators and radiators. The arrangement of the Commercial Credit Companies is with Copeland Products, Inc., and will enable 2000 dealers to sell electric refrigerators on down payments as low as 15%, and 18 monthly payments for the balance.

The General Contract Purchase Corporation's contract is with the National Radiator Corporation, which heretofore has never sold its products on time payments. The Purchase corporation is affiliated with the Morris Plan banks.

Research Narratives for March 15, 1929, published by the Engineering Foundation, 29 West 39th Street, New York, is devoted to "artificial climates" with particular reference to house heating and ventilation. The subject was handled by Prof. A. C. Willard of the University of Illinois, and the text is devoted largely to the work conducted at the Research Residence of the National Warm-Air Heating Association, in Urbana, Ill.

Obituary

Edwin S. Hallett

A distinguished career in the field of heating and ventilation was brought to a close when Edwin S. Hallett, chief engineer of the St. Louis Board of Education, died in that city, March 26. Mr. Hallett was one of those men who grow

Edwin S. Hallett

younger in spirit with the years. Always a delightful companion, he was at his best when addressing a gathering of engineers on some pet hobby, such as the use of ozone in ventilating work, or on some debatable point, when he always held the attention of his hearers by his keen thrusts and quick repartée.

Mr. Hallett could well be termed "a gentleman of the old school." A man of unfailing courtesy and sympathetic instincts, he not only endeared himself to his many associates and fellow engineers throughout the country, but lent distinction to the profession.

For years an advocate of the air recirculation idea in ventilating work, combined with the use of ozone, he had seen many of his theories justified by the event. Ever since he became chief engineer of the St. Louis Board of Education he followed the practice of air recirculation, and today his schools are examples of sound engineering.

From the time Mr. Hallett joined the A.S.H. & V.E. in 1918, he had been a frequent contributor of papers to the society. He served as a member of the council in 1921, and again in 1923. He was the author of a notable series of articles on "The Mechanical Ventilation of the St. Louis Schools," which appeared in THE HEATING AND VENTILATING MAGAZINE during 1926, and which were widely distributed in the form of reprints. At the time of his death he had in preparation additional articles for THE HEATING AND VENTILATING MAGAZINE.

To his many friends, among whom this writer was proud to be numbered, his death comes as a shock, which is softened only by the memory of his gracious personality.

A. S. A.

Theodore F. Merseles

Theodore Frelinghuysen Merseles, president of the Johns-Manville Corporation, New York, died as a result of a heart attack in Del Monte, Calif., March 6, in his 66th year.

In 1893, Mr. Merseles made his first step into big business by becoming manager and vice-president of the Western Wheel Works, and through his efforts making it one of the country's leading bicycle manufacturing companies. Competition necessitated a deal with Col. A. A. Pope, of Hartford, and A. G. Spalding, of Chicago, which resulted in the American Bicycle Company, which was known as the "bicycle trust," of which he became vice-president.

Mr. Merseles was well known for his accomplishments in reorganization and, in 1920, was selected by the J. P. Morgan interests to guide Montgomery Ward & Company out of its post-war deficit. This proved successful and, in 1923, the sales of the company showed a profit of $9,000,000.

J. P. Morgan & Company again called on Mr. Merseles in 1927 to succeed H. E. Manville as president of the roofing and asbestos company. At the time of his death, he was a director in many corporations and banks.

William P. Cooke

William Pinckney Cooke, secretary-treasurer of the Floral City Heater Co., Monroe, Mich., died suddenly at his home in Monroe, March 4, at the age of 67. For the past 20 years Mr. Cooke was connected with this company, and also was treasurer of the National Warm-Air Heating Association.

David Walter Munn

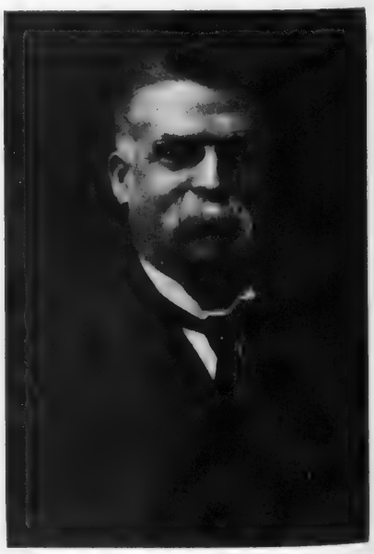
David Walter Munn, professor of mechanical engineering at the Nova Scotia Technical College, died at his residence in Halifax, January 23. Professor Munn graduated from McGill University with the degree of B.A. in 1898, receiving the degree of M.A. in 1902, and a B.Sc. in mechanical engineering (with honors) in 1907, from the same university. Later he received the degree of M. Sc. from the Massachusetts Institute of Technology, as a result of special research work. Following graduation, Professor Munn became a demonstrator in mechanical engineering at McGill University, and also was on the Canadian government coal testing staff. In 1908, he was appointed professor of mechanical engineering at the university, and in addition to that he was assistant professor of general engineering at Queen's University at Kingston, Ont. He was chief engineer, in 1918, of the Armstrong-Whitworth Co., Ltd., Canada, and during 1919-20, was professor of civil engineering at the Royal Military College at Kingston. In 1921, he joined the staff of the college where he held a professorship at the time of his death.

Professor Munn was secretary of the Nova Scotia Advisory Board for Fuel Research.

John Gormly

In the death of John Gormly, of Norristown, Pa., the heating and ventilating industry has lost a man who played an important part during the organization period of the idustry. He died January 31, in Atlantic City, where he had gone in search of health. Mr. Gormly had long been a sufferer from heart trouble; he retired from active business in 1909. News of his death was not generally known until it was announced at the March meeting of the Philadelphia Chapter of the A.S.H. & V.E.

Mr. Gormly was one of that far-sighted group of men who saw the necessity for an engineering organization in the industry to lead it on toward its destiny. He was one of the charter members of the American Society of Heating and Ventilating Engineers and served as president of the society in 1906-07. Although long inactive in business, he retained his interest in the



John Gormly

work of the society up to the day of his death. He was one of the society's three honorary members.

Mr. Gormly was born in West Chester, Pa., 78 years ago. He learned the steamfitting and plumbing trades and was started in business in Philadelphia in 1885. He was an old-time member of the National Association of Master Plumbers as well as of the Heating and Piping Contractors National Association, in both of which he was active before becoming associated with the work of the A.H. & V.E. His efforts to help guide the industry during its formative period is a story in itself which many of the older men in the industry have long cherished.

He is survived by a brother, Patrick Gormly, a former president of the Heating and Piping Contractors National Association.

Harvey A. Call

Harvey A. Call, of the research department of the Copper & Brass Research Association, died in New York after a short illness, February 8. In 1906, Mr. Call established a heating and plumbing business at Cornwall-on-the-Hudson. Eleven years later he became associated with the Mason & Hanger Company, to serve in the capacity of superintendent of heating, plumbing, sheet metal and sanitation, in connection with work at Camp Taylor in Louisville, Ky., the Newark Port Terminal in New Jersey, and the Charleston Port Terminal in South Carolina. Shortly after the war, Mr. Call became editor of *Sanitary and Heating Engineering*, and, in 1926, he joined the Copper & Brass Research Association.

Gas Mains Reach Small Communities

Manufactured gas, formerly available only in large cities, is now supplied to 317 communities in Illinois, most of them too small to sustain gas generating plants of their own, through the development of long distance transmission of the fuel.

Radiating from large, centrally-located gas plants, are 1269 miles of inter-city mains, most of which carry gas at high-pressure—some as great as 100 lbs. per sq. in. Pressure is reduced to about ½ lb. before the fuel is distributed to users.

In one instance gas is piped 85 mi. through a main of the Western United Gas & Electric Company, extending from Joliet to Harvard and serving many communities along its route. The Northern Indiana Public Service Company, serving a total of 143 communities in Northern Indiana, built 101 miles of new gas transmission lines in 1928, according to the company's annual report.

Gas Appliance Committee Holds Meeting

A meeting of the committee of the American Gas Association on "Approval Requirements of Central House-Heating Gas Appliances," met recently in the offices of the Public Service Co., Denver, Colo. Some changes were made in the standard approval requirements of house-heating appliances, which will be published at a later date in the committee bulletin. The following representatives of the committee were present: C. L. Bryant, of C. L. Bryant Company; T. M. Foulk, Public Service Company of Colorado; C. R. Miller, Portland Gas Coke Company; E. L. Payne, Payne Furnace Company; W. E. Stark, Bryant Boiler Company; H. L. Whitelaw, American Gas Products Corporation, and R. M. Conner, American Gas Association Testing Laboratory, Cleveland, O.

House-Heating Gas Rates for New Haven

A special rate for gas used by customers of the New Haven Gas Light Company for house heating became effective March 1.

The new rate provides gas for house heating at 75 cents per 1000 cu. ft. per month. To be entitled to this rate the customer must guarantee a minimum revenue over the eight months' heating season of $150, equivalent to the use of 200,000 cu. ft., with minimum monthly payments of $18.75.

Before the new rates were made engineers for the company made a thorough investigation of the question, and after a careful analysis they recommended the rate announced.

"Prometheus, U.S.A."—Man's Conquest of Fire

Oil-burner, gas-boiler, and thermostatic control salesmen who lack sales talk for their wares will surely find whole pages of Ernest Greenwood's latest book, "Prometheus, U. S. A.", adapted for their use in selling automatic heat. Although the book is primarily a history of man's discovery and use of fire, it leads up to the story of automatic house-heating and the conservation of energy and time resulting from the use of the fluid fuels—oil and gas.

As Mr. Greenwood states, "The story of Prometheus may be only a Greek myth but its moral is unmistakable—without fire, man would have remained but slightly above the level of the animals and subject to all of the limitations of animal life . . . . . It is fire, plus the modern fuel and modern methods of utilizing fuel, that has raised our standards of living so high, and a constant improvement in the standard of living is only another way of defining the progress of civilization."

In the chapter on "The Story of Coal," the author tells of the early uses of this fuel and the difficulty with which the first boatloads of coal were sold in Philadelphia. To use Mr. Greenwood's words, "Only a little more than a hundred years ago people were laughing at those who bought these 'black stones,' just as only a little more than forty-five years ago people were laughing at Thomas A. Edison; a little more than fifteen years ago were laughing at the radio; and less than ten years ago were sneering at the oil burner in furnaces for heating homes." The author's belief is that the sum total of modern construction in America is nothing more or less than a monument to coal.

Following this, the fascinating story of the development of the gas industry relates how doctors, theologians, police

From "Prometheus, U.S.A.," Courtesy American Radiator Company.

Benjamin Franklin and His Friends Enjoying the Warmth of His Stove

and laymen objected to the early use of gas in New England. Medical authorities claimed that artificial illumination would encourage people to stay out at night and thus lead to an increase of ailments. Churchmen objected, so they said, because artificial illumination was an attempt to interfere with the divine plan of the world which ordained that it should be dark at night. The police said that horses would be frightened and thieves emboldened.

The stories of petroleum and the development of house-heating by oil set forth the benefits of oil heating as compared with the old-fashioned methods of heating, and the uses of fuel oil in industry are outlined in a way that will indicate the unrealized possible expansion in the use of oil.

"The Battle of the Fuels," the three-cornered fight among fuel oil, manufactured gas and coal, compares the advantages and disadvantages of the three fuels from an economic standpoint and also gives the viewpoint of the home-owner—the user of the fuels. A chapter on "What Price Heat" presents, in a convincing manner, the argument that a prospect buying an automobile will not compare a Lincoln and Ford, or a Cadillac and Chevrolet, when buying a car, but figures just how much automobile he is getting for his money. When buying a heating system for his home, however, this same prospect will think only in terms of money. Mr. Greenwood outlines in a masterful way the advantages accruing to the home-owner who buys automatic heating, and concludes the chapter by showing that, in the end, the cost of the more expensive oil-burning system is justified.

In the closing chapters of the book, taxation, governmental regulation and conservation in relation to the oil industry are outlined. Written in a readable narrative style, the book will appeal to home-owners as well as to heating men in general and oil and gas appliance engineers and salesmen in particular. Published by Harper & Bros., New York. Size 5½ in. x 8½ in. Pp. 213. Price, $2.50.

The Modern Home, Volume I, No. 1, published by the May Oil Burner Corp., Baltimore, Md., contains several photographs of attractive homes heated by May oil burners, among them the home of Galli-Curci, near Catskill, N. Y. Other articles contained in the first issue are "Fitting up the Modern Cellar," "Heating the Home With Oil," and several on subjects of general interest to home-owners, such as "Antiques in a Modern Setting." It is the purpose of the May Oil Burner Corporation to publish this magazine monthly.

New Apparatus and Appliances

Erie Unit Heaters

A line of suspended unit heaters has been announced by the Erie Heating Systems, Erie, Pa. Due to the construction of the heating element, which is made of aluminum, this heater is said to furnish a greater volume of heated air per second than the average type of unit heater, and projects this air at a low velocity throughout the building. Each heating section is tested with 800 lbs. of hydrostatic pressure and 150 lbs. steam pressure, and may be operated on water, vapor or steam from 1 oz. to 250 lbs. pressure. The heating element is ductile and can be thrown on a cement floor without breaking or chipping. A cross-section of the fins of the heating element is somewhat similar to that of an airplane wing, which has a low resistance factor. The unit heater is made of aluminum throughout.

The louvres are of airplane wing design and pivoted at both ends to the aluminum housing. The louvres can be set separately at any angle and in this way permit the air to be directed to the desirable area or sections of the space to be heated. The heater is so light in weight that it does not burden the supply lines which support it.

Equipped with a special thrust bearing, the motor built into this unit heater was designed for this specific purpose. It is wholly enclosed in an aluminum housing, eliminating the need for cleaning at more or less regular intervals. The one motor frame takes all windings irrespective of current characteristics, including 550, 440, 220 and 110 volts; 25, 33, 40, 50 to 60 cycles and 1, 2 or 3 phase. The electric fan is of four-blade aluminum construction, secured to a steel spider especially designed to project quietly and economically the greatest volume of air through the heating element for distribution over the greatest area. Installation can be made by two steamfitters in an hour's time.

These heaters are made in three models, numbers 14, 20 and 27, with capacities ranging from 163 sq. ft. to 1123 sq. ft., with a 70° F. intake air temperature. Each model can be furnished in two types, depending on the R.P.M. of the motor, each having different capacities.

Erie units also are made for concealed and cabinet heating.

Needle Valve for Oil Burners

A needle valve, particularly suitable for oil burners, small refrigerating units and other appliances requiring close control of liquid or gases, has been placed on the market by the Pratt & Cady Company, division of Reading Steel Casting Co., Bridgeport, Conn.

The features of this valve are its strength and ability to give long service under severe conditions. It is made of high test bar stock bronze throughout, with the exception of the hand wheel which is of malleable iron.

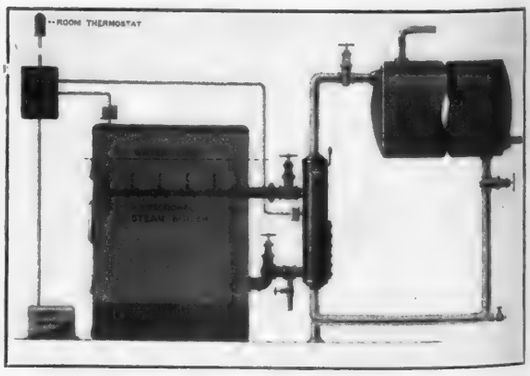
Master Heat Regulator

"Master" is the name of a heat regulator brought out by the White Mfg. Co., St. Paul, Minn. In a coal-burning plant this device operates by controlling the draft. When applied to oil and gas burners or automatic coal stokers it regulates the valves controlling the supply of fuel and air. The device is furnished either with or without an eight-day clock.

Automatic Control and Jackets for Taco Heaters

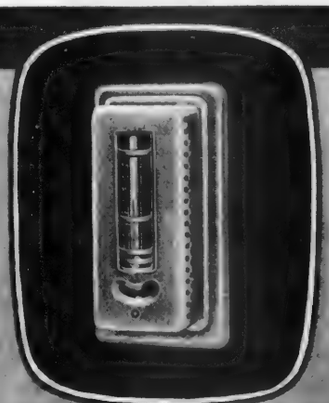
Two improvements have been made to the line of Taco heaters made by Taco Heaters, Inc., 342 Madison Ave., New York. The first is an insulated jacket made of air-cell asbestos which aids in conserving the heat in the water, and keeping the basement temperature down. An enameled jacket in color adds to the appearance of the heater and makes it possible to harmonize this accessory with the color scheme of jacketed boilers.

The second improvement is a Taco panel for use with systems using oil or gas, so that the entire system can be made automatic. The panel is connected to a room thermostat and coordinates the regulators and simplifies the system.



Super-Taco Water Heater and Panel

BOSTON CONSOLIDATED GAS COMPANY BUILDING
BOSTON, MASSACHUSETTS
PARKER, THOMAS & RICE, *Architects*, Boston, Mass.
HOLLIS FRENCH & ALLEN HUBBARD, *Engineers*, Boston, Mass.
H. E. WHITTEN CO., *Heating Contractors*, Boston, Mass.



The Powers Type D Thermostat

Does not need to be adjusted or overhauled annually. Often gives 15 to 20 years of accurate control without repairs of any kind. Gives true GRADUATED control. Uses only 10% of compressed air required by other thermostats. Costs more. It's worth more!

"We will have a POWERS *system and nothing else"*

Intelligent buyers of temperature control want SERVICE built into the apparatus they buy. They know the folly of buying a cheap system of temperature control and being annoyed later with the trouble and expense of service calls.

More than the usual amount of investigation of Temperature Control was made by the owners of the building shown at the left, before they insisted:

"We will have a POWERS *System, and nothing else!"*

Why?—because its greater dependability and long service without repairs or adjustments insures the maximum return on the investment.

We build SERVICE into Powers Control. Its first cost is usually higher, but it always costs much less in the end.

THE POWERS REGULATOR COMPANY

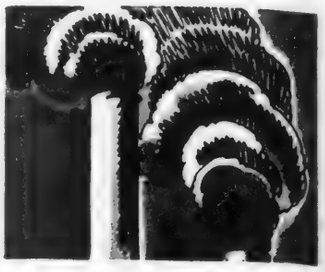
35 Years of Specialization in Temperature Control

CHICAGO: 2718 Greenview Avenue
NEW YORK CITY: 137 East 46th St.

Offices in 35 Other Cities

The Canadian Powers Regulator Co., Ltd.
Toronto, Ont.

POWERS



HOFFMAN SPEC
ANNO
TWO NEW

HOFFMAN MOTO-HEATERS . . .

Hoffman Moto-Heaters are an improved type of unit heaters, scientifically designed and made in accordance with the highest engineering standards.

Heating engineers and contractors will find in Hoffman Moto-Heaters a product that insures maximum efficiency at lowest cost per B. T. U.

Hoffman Moto-Heaters are easy to install and can be sold with the assurance that they will give years of satisfactory service without leakage or other mechanical troubles.

Made in both suspended and floor mounted styles, in a complete range of sizes for all industrial and commercial heating requirements.

Every heater tested at 1,000 pounds hydrostatic pressure and guaranteed for 200 pounds operating pressure. Furnished with Super-Fin heating surface. Copper tubes are united to header by fusion of metal, to prevent danger of leakage.

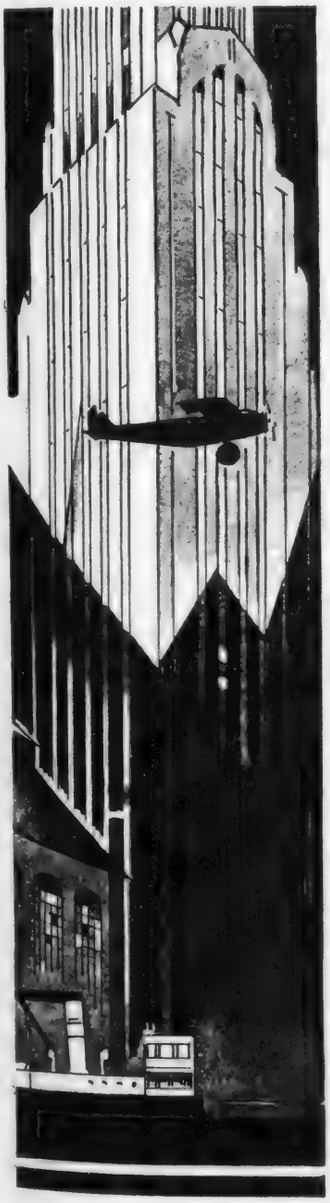
HOFFMAN HEATING SPECIALTIES FOR ALL TYPES OF STEAM INSTALLATIONS

The addition of these two new products marks another forward step in making the Hoffman line more complete. In Hoffman Valves, Hoffman Controlled Heat Equipment, Hoffman Moto-Heaters and Hoffman-Economy Pumps, heating engineers and contractors are now offered a reliable line of heating specialties for residences and all types of commercial and industrial buildings. The selection of complete Hoffman equipment simplifies specifications and purchasing, insures competent engineering counsel and avoids divided responsibility.

IALTY COMPANY

UNCES

PRODUCTS



HOFFMAN-ECONOMY PUMPS . .

Condensation Pumps — Compactly designed and sturdily constructed, Hoffman-Economy Condensation Pumps meet every requirement of efficiency and dependability. Mounted on heavy cast iron base and driven by a powerful motor of standard make and size. Removable cover gives access to all working parts without breaking pipe connections.

Vacuum Pumps—The Hoffman-Economy Vacuum Pump is a highly efficient and reliable unit for the rapid removal of air and condensate from heating systems.

Vacuum producer is of the jet type—the simplest and best known method. No close clearances on pump; no danger of water overflowing to floor in event of electrical failure. Pump operates efficiently even in handling very hot water, and can "pull" high vacuum.

There is a Hoffman-Economy Pump for every type of heating job.

Send Coupon for New Catalogues

Catalogues and engineering data on Hoffman Moto-Heaters and Hoffman-Economy Pumps will gladly be sent upon request. Fill out attached coupon and mail to-day.

HOFFMAN SPECIALTY COMPANY, INC., Dept., C-58
Waterbury, Conn.

Please send catalogue on

_____Hoffman Moto-Heaters
_____Hoffman-Economy Pumps

Name .....

Street .....

City and State .....

By .....

Fig. 1. Grid-Glow Tube for Oil-Burner Control

Knowles Grid-Glow Tubes for Oil-Burner Control

A device in the form of a grid-glow tube combination safety device for oil-burner control has been brought out by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. It is designed to safeguard an oil-burner by making it impossible to turn on the oil unless the pilot is lighted. Its operation is due to the action of the pilot light in lowering the electrical resistance of air between the two wire electros and, in that way, actuating the sensitive relay. This device has been given the name of the Knowles grid-glow tube.

Until now, thermostatic devices, operated by the heat of the flame and located in the flue or in proximity to the fire brick of the furnace, have been used as a safety device, to prevent puff-backs or more serious explosions in case of (a) belated electric ignition in starting the burner, (b) flame failure while the burner is operating. These puff-backs occur if belated ignition takes place after a certain amount of atomized oil has been introduced into the furnace, about five seconds being sufficient to cause such trouble.

The grid-glow tube does not operate on the heat of the flame, but on its conductivity, the conductivity being zero with no flame. This conductivity is measured between a flame terminal and ground, if the flame or the conducting gases reach the grounded metallic furnace structure, or between two flame terminals.

The action of the grid-glow tube is instantaneous and the relay C (Fig. 2), introduces a time delay of two to three seconds before shutting down the motor in case of flame failure. This time delay is necessary to allow sufficient time under normal conditions for the fuel to reach the furnace after the starting of the motor.

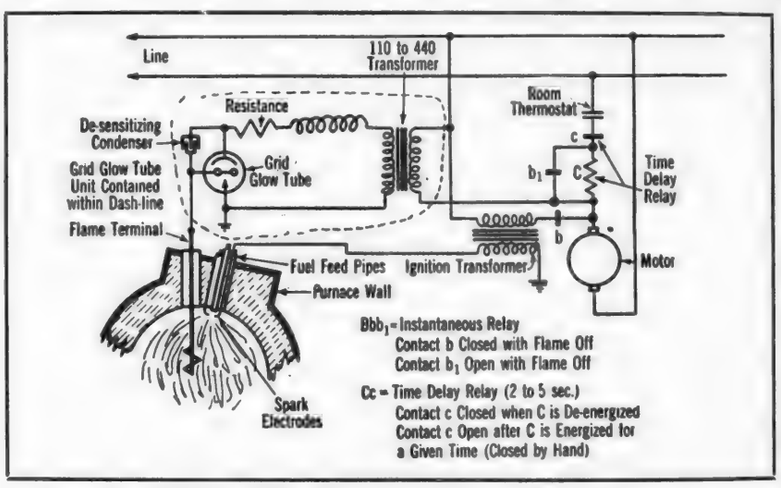

Line
110 to 440 Transformer
Resistance
Room Thermostat
De-sensitizing Condenser
Grid Glow Tube Unit Contained within Dash-line
Grid Glow Tube
Time Delay Relay
Flame Terminal
Fuel Feed Pipes
Ignition Transformer
Motor
Furnace Wall
Bbb1 = Instantaneous Relay
Contact b Closed with Flame Off
Contact b1 Open with Flame Off
Cc = Time Delay Relay (2 to 5 sec.)
Contact c Closed when C is De-energized
Contact c Open after C is Energized for a Given Time (Closed by Hand)
Spark Electrodes

Fig. 2. Wiring Diagram for Grid-Glow Tube Control

Stoker-Unit Boiler

A horizontal steel boiler, called the Stoker-Unit, equipped with a stoker, has been announced by the Oil City Boiler Works, Oil City, Pa. The special feature of this boiler is the manner in which it has been designed to accommodate a stoker, keeping it surrounded by the water leg portion of the fire box, with the mud ring well below the combustion zone. The advantage of this construction is that protection is afforded the mud ring without the use of a special high refractory brick wall in the ash pit. In addition the elimination of the fire brick protecting wall for the mud ring leaves a larger free grate area which in turn makes possible the operation of this boiler at 150% of ratings. The Stoker-Unit boiler was designed with a high crown sheet, there being a clear space of 6 ft. from the top of the stoker retort to the top of the fire box. The length and width of the furnace are so proportioned that the proper combustion volume is provided for the stoker.

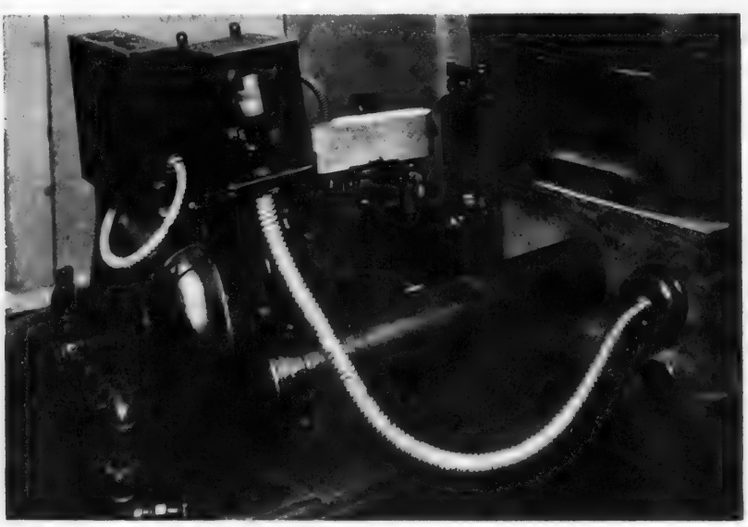
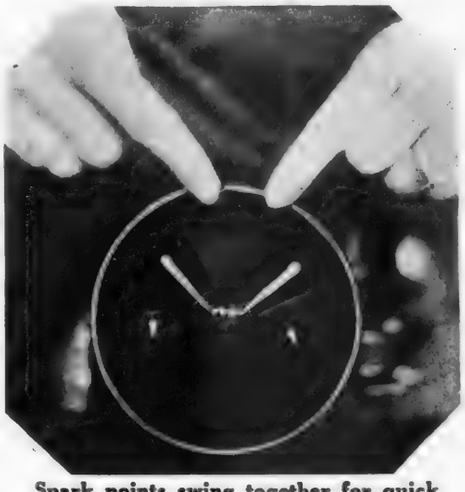


Fig. 3. Installation of Oil Burner Equipped with Grid-Glow Tube

Due to the high temperature resulting from the forced draft obtained with the stoker, heavily reinforced castings have been used for doors and liners. These are further protected by coverings of asbestos blocks and high temperature cement. The door joints are machined and tightly packed with asbestos rope.

Stoker-Unit boilers are made in sizes ranging from 75 to 300 H.P. and for working pressure from 15 to 125 lbs. per sq. in. The low pressure, or 15-lb. boilers, are built either riveted or welded as specified.

HART "*Finger-tip ignition*" *Cuts Down Dealer Service Work*



Spark points swing together for quick fuel ignition.

—then spark points swing apart to avoid carbonizing.

Everyone appreciates "finger-tip" ignition, exclusively Preferred-Hart's—but most of all those dealers who have been out time, money and profits in the continual servicing of carbon-fouled spark points.

"Finger-tip" ignition ends these losses. As soon as the thermostat signals for more heat, these spark points move into position, directly in front of the fuel nozzle. Their contact tips swing together as easily as a man's fingers. The oil and air mixture is ignited. Then, in 40 seconds, *they swing back, clear of the path of fuel and flame—clear of the fouling touch of carbon!*

"Finger-tip" ignition means not merely *more* satisfaction for the purchaser—but *less* service work for the dealer.

Only HART has *"Triple Atomization"*—a system that *triply* insures a uniform and economical oil and air mixture. At three different points the oil stream is mixed with air—the end of the vacuum control, at the pump, and again at the tip of the fuel nozzle.

Only HART has *"Vacuum Control"* — that brings oil to the burner from the storage tank (not by gravity feed) under vacuum control. No oil can flow unless the burner is running; no oil is used except when needed.

But you haven't heard the half of it yet! Write for facts on exclusive mechanical details that are making it so much easier for dealers to sell Preferred-Hart Oil Burners at such better profits.

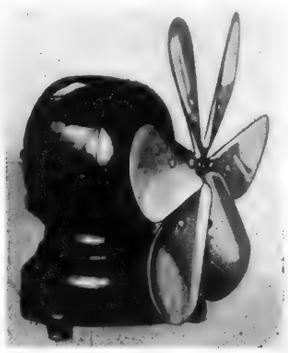
HART OIL HEAT

MEMBER OIL HEATING INSTITUTE OIL HEAT AS DEPENDABLE AS SUNSHINE

PREFERRED OIL BURNERS, INC.
PEORIA ILLINOIS

Peerless Warm-Air Furnace Fan

A completely-enclosed warm-air furnace fan containing only one moving part is announced by the Peerless Electric Co., Warren, O. Housed in the motor base is a compensator coil for taking care of variations in voltage. Heavy cast iron



Peerless Warm-Air Furnace Fan

padded with rubber is used in the base construction. Turning at 1200 R.P.M. the 12-in. fan has a capacity of 1000 cu. ft. per min. In overall height the device measures 13 in. Its weight is 20 lbs. When in use this fan does not interfere with radio reception, according to the manufacturer. Installation is accomplished through a slide in the cold-air duct of the furnace. A connecting wire to the power supply line is brought out through a bushing. A single switch may be located near the furnace draft control, or control switches may be installed at various convenient points throughout the house.

Conco Temperature Control for Individual Rooms

An independent type temperature control valve has been announced by the Conco Manufacturing Co., Milwaukee, Wis. This valve is a combination of a graduated packless supply valve and temperature control unit for use on any two-pipe steam or water heating system. The valve operates automatically and will open or close when there is a variation in the room temperature of 1° or 2°, thus regulating the flow of steam to each individual radiator. This valve has three moving parts, the large bellows, lever bar and valve stem. As the room temperature rises, the volatile liquid in the thermal member vaporizes, expanding the bellows upward. The lever bar is connected at one end by means of rocker bearings and at the other end to another thermal member. As the main bellows expands upward the valve stem is forced down, closing the steam inlet when the room has reached the desired temperature. When the room temperature drops the liquid in the thermal member condenses, causing a contraction of the bellows and thus opens the radiator valve.

Each valve may be set after installation to close at any desired temperature. This adjustment can be made by turning the valve wheel or handle in the same manner as an ordinary radiator valve. Higher temperatures than that at which the valve originally is set are secured by adjusting the tension spring above the thermal member. These valves may be installed on either old or present installations as well as on new systems, and are available in either ½ in., ¾ in. or 1 in. sizes.

Motor-Operated Pressure-Reducing Valve

A pressure-reducing valve, based on the principle of the Venturi nozzle and a motor operated needle valve control for flow regulation have been announced by the Schutte & Koerting Co., Philadelphia, Pa. The steam flow valves are regulated by changes in the pressure on the outlet or low-pressure side of the expanding nozzle. Pressure changes at these points register at the control panel, which are equipped with special regulating devices controlling the application of electric current to the valve.

These pressure changes cause a movement of diaphragm, which are connected by a series of levers to contact fingers riding over small revolving drums. The contact point on these drums produce a make-and-break action and cause an intermittent application of current to the main valve motors.

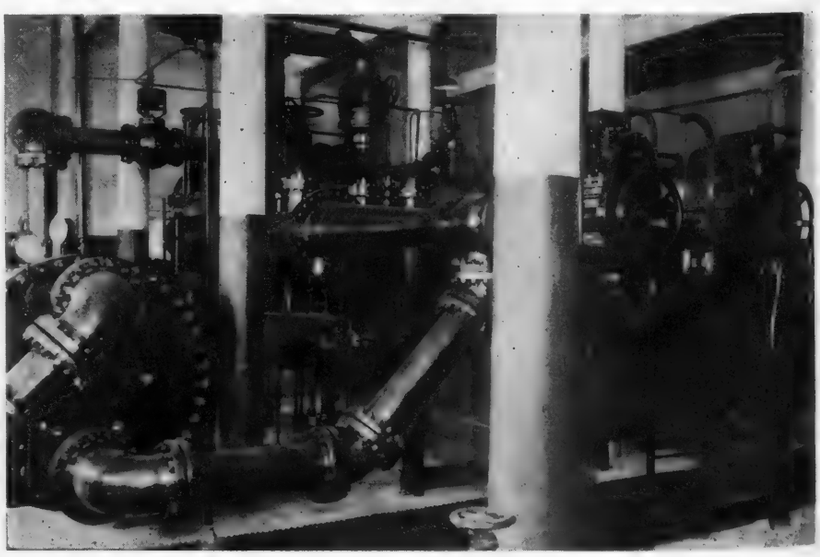
An increase in pressure above the predetermined point operates the valve motors to close the valves and reduce the steam flow. A decrease in pressure on the low-pressure end of the system causes the valve motors to open the valves and increase the steam flow until the pressure has been reestablished.

These motor-operating reducing valves are built for both low- and high-pressure service. The illustration shows an application of two of these valves at the Baltimore Avenue heating plant at the Kansas City Light and Power Co., Kansas City, Mo. These two reducing valves have 10-in. inlets and 12-in. discharge connections and are operated through gears by 220-volt, D.C. motors.

Explosion Proof Ventilating Unit

An explosion proof ventilating unit for the application of finishing material in factories, is announced by the Paasche Airbrush Co., Chicago, Ill. The ventilating motor is fully enclosed and mounted on the top of the finishing booth outside of the path of the fumes, thus saving space and affording absolute safety. No paint fumes can touch the motor bearings, due to the air space between the bearings. A further advantage is that the screened air is pulled over the motor, cooling it and preventing explosion.

The booth is made from sections of steel panels welded to angle iron frames, and can be converted into larger or smaller sizes. The sectional collector baffles pick up all solid material, allowing only the gas to escape through the piping, thus eliminating any combustion of the exhaust fumes. A patented water and oil separator with an electric air and material heater provides clean, dry air. An air regulator with drop piping furnishes control of the pressure from a few pounds up to 100 lbs.



Schutte & Koerting Motor-Operated Reducing Valve in Plant of Kansas City Light and Power Company

Every Power Engineer Can Use This New Book—

THERE'S a unique and exceedingly helpful bundle of information for designers and specification men in our new 8½ x 11 in. loose-leaf folder entitled *"Engineering Data on Pipe Fabrication."* It contains, in most convenient and usable form, nearly 100 pages of the latest authoritative data. This is drawn from standard A.S.M.E., A.S.T.M., Power Piping Society and other sources and, where no other standards exist, from our own extensive shop and field experience in the power piping field.

Much of the book deals with welded and integrally flanged fabricated piping and cast steel fittings for working pressures of 400 to 1350 pounds. A section on hangers and supports is included. Numerous mechanical drawings, with accompanying tables of dimensions similar to those covering Sargol joints reproduced here in greatly reduced size, add to the practical value of this vital engineering data.

This book will prove of great assistance to engineers handling detail specifications of power plant and industrial piping. A copy for your use will be sent without charge. Please use the coupon below and attach it to your own business stationery.

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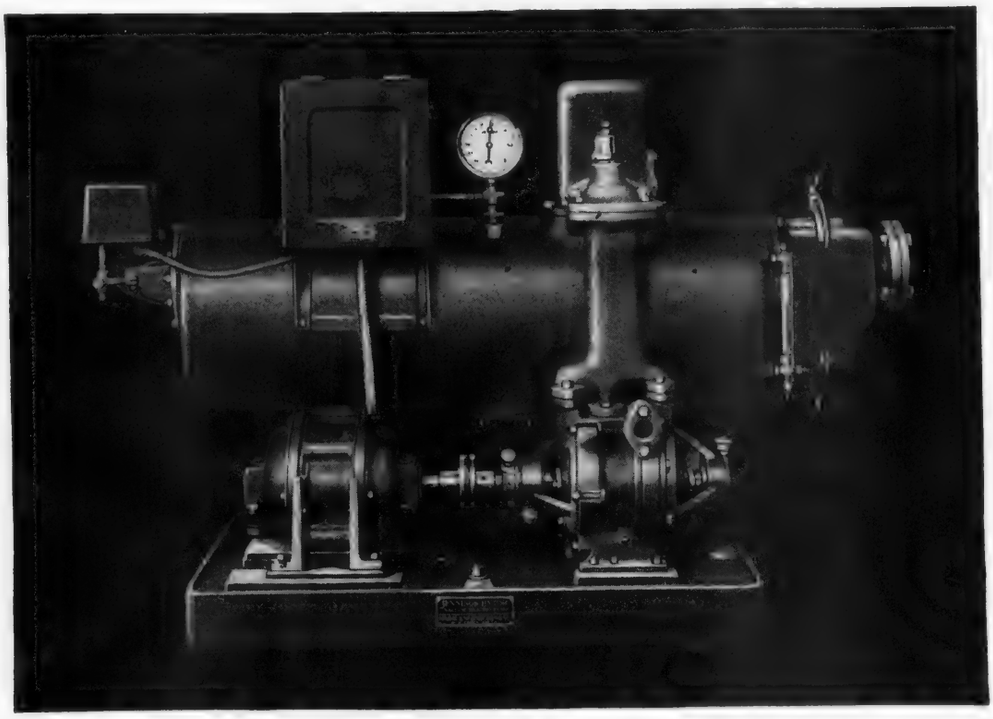

Jennings Vacuum Heating Pumps are furnished in capacities ranging from 4 to 400 g.p.m. of water and 3 to 171 cu. ft. per min. of air. For serving up to 300,000 sq. ft. equivalent direct radiation. Bulletin 85 gives more complete information. Write for a copy.

Know its capacity
before you install a heating pump

THERE is just one way to make certain that a return line vacuum steam heating pump is of the proper size and type to handle a given job. And that is to know beforehand the working capacity of the pump—the actually delivered quantities of air and water per minute that the pump can be counted on to remove from the heating system.

This important information is supplied with every Jennings Vacuum Heating Pump. When you purchase a Jennings, you do not have to depend on published ratings giving merely the number of sq. ft. of radiation for which it is recommended. Instead, you receive a certified test report giving the precise working capacities of the pump—the amounts of water and air, in g.p.m. and cu. ft. per min., that it delivered when tested under working conditions. More than that, the calibrated orifice with which the test was made is also available so you can conduct your own tests and compare the Jennings Vacuum Heating Pump with any other competitive unit.

RETURN LINE AND AIR LINE VACUUM HEATING PUMPS—CONDENSATION PUMPS—COMPRESSORS AND VACUUM PUMPS FOR AIR AND GASES—STANDARD AND SUCTION CENTRIFUGAL PUMPS—HOUSE SERVICE PUMPS—SEWAGE EJECTORS—SUMP PUMPS.

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THE NASH ENGINEERING CO 81 WILSON ROAD, SOUTH NORWALK CONN.

Trade and Miscellaneous Notes

Coming Events

April 9-11, 1929. Sixth annual convention of the American Oil Burner Association in New York. Headquarters at the Hotel Pennsylvania.

April 24-26, 1929. Annual meeting of the National Warm-Air Heating Association in Chicago. Headquarters at the Hotel Stevens.

April 24-26, 1929. Annual meeting of the American Welding Society in New York. Headquarters at 33 West 39th Street.

May 13-16, 1929. Annual meeting of National Fire Protection Association in Memphis. Headquarters at Hotel Peabody.

June 10-13, 1929. Fortieth annual convention of the Heating and Piping Contractors National Association in St. Louis. Headquarters at the New Jefferson Hotel.

June 11-14, 1929. Twentieth annual convention of the National District Heating Association in Detroit.

June 24-28, 1929. Midsummer meeting of the American Society of Heating and Ventilating Engineers at Lake of Bays, Ont., Can. Headquarters at Bigwin Inn.

October 14-18, 1929. Eleventh annual convention of the American Gas Association at Atlantic City, N. J. Headquarters at Municipal Auditorium.

Miscellaneous Notes

February building operations as reported by the F. W. Dodge Corporation, show a decrease for the 37 states east of the Rocky Mountains. There was a decrease of 12% from the January total and a 22% decrease from the total for February of last year. The total figures for these states were $361,273,900. Analysis of this record shows that 36% of all construction was for residential buildings, 19% for commercial buildings, 16% for public works and utilities, and 16% for industrial projects.

Contracts in New York State and Northern New Jersey amounted to $74,985,900, representing a decrease of 26% from the preceding month and 46% from February of last year. In the New England States figures amounted to $26,430,700, representing the highest February contract total ever recorded for this district. It was 15% ahead of the total for February of last year but there was a decrease of 10% from the January total of this year.

In the Middle Atlantic States construction contracts amounted to $50,689,700, which was the second largest February record for these states. It was an increase of 3% over the total for January, 1929, and an increase of 9% over the total for February, 1928. Contracts in the Pittsburgh District amounted to $50,298,500, representing the second highest February contract total on record for this territory. It was 22% ahead of the total for February of last year but a 12% decrease from the total for January of this year.

The Central West reports contracts amounting to $99,321,300, which shows a decrease of 12% below the total for the preceding month and 35% decrease from the total for February, 1928. Figures in the Northwest amounted to $3,746,500, representing an increase of 70% over the February total for last year but showing a 40% decrease from the total for January of this year.

Contracts in the Southeastern States represent a total of $34,266,700, showing a 9% decrease from the total for last month and 12% from the total for February, 1928. Texas reports contracts amounting to $21,534,900, which was the highest February contract total ever recorded in this state. It was 36% over the total for the preceding month as well as an increase of 1% over the total for February of last year.

Homer R. Linn, chief engineer of the Western office of the American Radiator Co., in Chicago, is confined to his home as the result of a fractured rib sustained by a fall.

Ohio State University announces graduate fellowships in engineering during 1929-1930. These fellowships are awarded to holders of bachelor's and master's degrees. Research projects (including thesis) constitute a large portion of the required work and are supplemented by approved graduate courses. Full information is available from the Dean, Graduate School, Ohio State University, Columbus, O.

National Pipe and Supplies Association, at its twentieth annual convention at the William Penn Hotel, Pittsburgh, Pa., May 13-15, will have the following program: Monday, the 13th, golf tournament at the Pittsburgh Field Club; Tuesday, the 14th, sessions devoted entirely to manufacturers and jobbers in a presentation by the manufacturers of the outstanding conditions in the industry today; Wednesday, the 15th, devoted entirely to the Federal Trade Commission for trade practice conference for the heating and plumbing industry.

Building Officials' Conference of America will hold its 1929 convention at the William Penn Hotel, Pittsburgh, Pa., April 22-26. National and local building material dealers and manufacturing concerns have been provided with 9000 sq. ft. for displays in the exhibition room.

Ninth Annual Own-Your-Home Building and Equipment Exposition will be held in Chicago, April 27 to May 11, under the auspices of the Chicago Real Estate Board.

Industrial Arts Show of the Eastern States Exposition will be held in Springfield, Mass., September 15-21. An attendance of 300,000 is expected at this 13th annual exhibition. Three acres of floor space will be occupied in the Industrial Arts Building, in addition to 22 acres of exhibition space under roof in other buildings.

Twelfth Exposition of Chemical Industries will be held at Grand Central Palace, New York, during the week of May 6. Those associated in all branches of the chemical industry will find numerous interesting exhibits at this exposition.

Kewanee Boiler Corporation Elects Officers

At the annual meeting held in the offices of the American Radiator Company, in New York, March 6, B. F. Baker, treasurer of the Kewanee Boiler Company, since its inception in 1892, was elected president and treasurer of the Kewanee Boiler Corporation, to succeed E. E. Baker who died recently.

M. F. Moore was re-elected vice-president in charge of production. Mr. Moore is one of the corporation's first employees. R. B. Dickson was re-elected vice-president in charge of sales; H. D. Cherry, secretary; E. F. Wagner, assistant secretary, and Arthur Cook, assistant treasurer. Rolland J. Hamilton, vice-president and secretary of the American Radiator Company, was appointed assistant secretary of the corporation.

Directors elected were B. F. Baker; Clarence M. Woolley, president of the American Radiator Company; Rolland J. Hamilton, of New York; C. K. Foster, of Chicago, and D. M. Forgan.

Ozone Apparatus Patents

The United States Ozone Company of America, Scottdale, Pa., has sent out a notice to the effect that it is taking steps to protect its patent rights on ozone apparatus for purifying air and water, against infringement.

American Radiator Increases Number of Branch Offices

In accordance with a new policy adopted by the American Radiator Company, many new branches have been established, particularly in the metropolitan districts of New York and Chicago. In New York the new branches include the following: 1160 Flushing Ave., Brooklyn, in charge of F. H. Martinell; Foot of East 46th St., Bayonne, N. J., in charge of L. H. Croley; 164-01 Hillside Ave., Jamaica, L. I., in charge of Peter Fleury; 402 Broad St., Newark, N. J., in charge of F. J. Bluhm; Beechwood Ave. & 2nd St., New Rochelle, N. Y., in charge of R. I. Scott; and Paterson, N. J., in charge of E. W. Felt, of Warren Point, N. J.

In the Chicago district, the new branches are: 6216 No. Clark Street, Chicago, in charge of W. H. Conrad; 7600 Cottage Grove Ave., Chicago, in charge of Stuart Smith; 5965 West Madison St., Chicago, in charge of H. A. Voss.

Other recently-established branches are: Dallas Tex., Ervay St. & Patterson Ave., E. A. Rebhan; Grand Rapids, Mich., 44 North Division St., P. J. Busch; New Haven, Conn., South Front & River Sts., A. F. Downe; Portland, Me., 641 Congress St., R. D. Rich; Providence, R. I., 38 Fountain St., H. H. Chaplin; Reading, Pa., 116 North Fifth St., M. F. Stack; Richmond, Va., 1713 Wilson St., J. D. Rogers, Jr.; Rochester, N. Y., 253 East Ave., A. J. Kibler; Moline, Ill., 1317 Fifth Ave., F. E. Riddile; Worcester, Mass., 222 Main St., F. R. Hastie.

Petroleum Heat and Power Company Adds New Department

A publicity service bureau for agents, distributors and dealers in connection with advertising and publicity work, has been organized by the Petroleum Heat and Power Co., Stamford, Conn. J. R. Lunstead, formerly associated with the Radio Corporation of America, is in charge of the new bureau.

Local advertising is considered of great importance by the Petroleum Heat and Power Company and the publicity service bureau will do everything possible to aid the local dealers in carrying on such advertising and also in other sales promotion work. There will be available for distributors and dealers electros and mats for complete newspaper ads. An advertising campaign has been planned for this spring, summer and fall in general and trade magazines, billboard advertisements and by direct mail.

Manufacturers' Notes

Chicago Pump Co., Chicago, Ill., has added two new representatives to its staff: Bernhard E. Hovind, 326 Jay St., La Crosse, Wis., and S. T. Weaver Co., 1002 North Clinch St., Knoxville, Tenn.

York Heating and Ventilating Corp., Philadelphia, Pa., has established an office at 1514 Chemical Bldg., St. Louis, Mo. George W. Meyers, who has been associated with the company for the past eight years, has been appointed to take charge of this new office. Prior to this appointment, Mr. Meyers was assistant manager of the Philadelphia district office.

Century Electric Co., St. Louis, Mo., has opened a sales office and located a stock in Indianapolis, Ind., at 718 Continental Bank Building. A district sales office has been established and stock located in the Union State Bank Bldg., Omaha, Neb.

Dayton-Dowd Co., Quincy, Ill., has appointed D. C. Elphinstone, Inc., 120 South Calvert St., Baltimore, Md., as district representative for the Baltimore and Maryland district. The pump division sales will be in direct charge of W. C. Reamy, Jr.

English & Lauer, Inc., 1224 South San Pedro St., Los Angeles, Cal., has appointed Frank Demarest, for the past 18 years in charge of the pump department of the Coon-DeVisser Co., Detroit, to serve in a similar capacity with the company.

Bryan Steam Corp., Peru, Ind., has established the following eastern warehouses: For New Jersey, Bryan Boilers, Inc., Newark; Long Island, N. Y., Bryan Heating Utilities, Inc., Jamaica, L. I.; Eastern New York State, Worsfold & Hawvermale, Inc., Nyack, N. Y.; Central and Western New York, Bryan Boiler Sales, Inc., Syracuse, N. Y., and in Connecticut, Bryan Boiler Co., Greenwich, Conn.

National Radiator Corp., Johnstown, Pa., reports for 1928, profit before depreciation of $500,832, and after deducting reserves for depreciation and for doubtful accounts and providing for adjustment of inventory for obsolete products and for interest on debentures, showed a net loss for the year of $1,343,501.

Bell & Gossett, Chicago, announces the following new distributors: Vessey-Gilbert Co., 2401 Chestnut St., Philadelphia, will cover the territory in the Philadelphia district, New Jersey, eastern Pennsylvania and Maryland. M. M. Rivard Sales Co., 601 Gumbel Bldg., Kansas City, Mo., will cover the territory in and around Kansas City.

Bryan Steam Corp., Peru, Ind., reports that the all-metal, steam-driven dirigible "City of Glendale" will be equipped with high-pressure boilers, which are manufactured by the company. The power plant will consist of four boilers, each with steam pressures of 600 lbs. per sq. in.

The Frost Research Laboratory, 1326 Markley St., Norristown, Pa., announces that Malcolm C. W. Tomlinson has joined the organization as research physicist. Mr. Tomlinson, for the past six years, has been connected with the Research Laboratory of the Western Electric Company. An important part of his work in his new connection will be to extend the application of air conditioning to space heating.

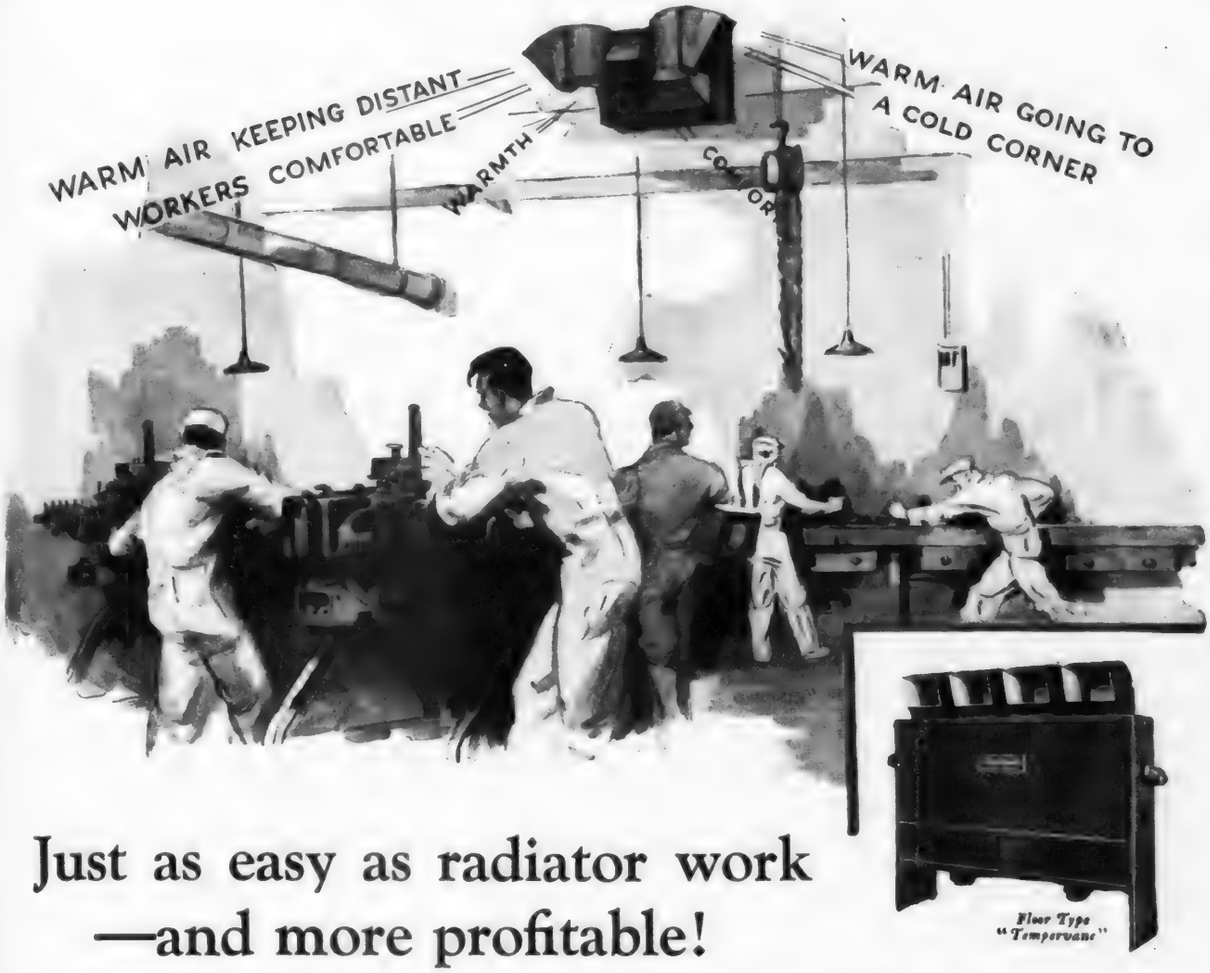
S. T. Johnson Co., Oakland, Calif., has appointed T. M. Bradley, 214 North Salem St., Sumter, S. C., as representative throughout Sumter County and adjacent territory. Mortiz Wolf, McKeesport, Pa., and the Brubach Plumbing Co., 1314 Woodsrun Ave., Pittsburgh, have been appointed representatives in their respective territories.

Wagner Electric Corp., St. Louis, Mo., has appointed K. G. Baker to the Cincinnati sales force. Mr. Baker formerly was connected with the Century Electric Company and Fulton Iron Works.

American Gas Products Corp., 376 Lafayette St., New York, held its third annual sales conference recently at the Hotel Knickerbocker. New products were exhibited and thoroughly examined by the representatives. A visit was made to the Institute of Thermal Research of the American Radiator Company, where the men became acquainted with the thoroughness with which new developments on Ideal gas boilers are worked out.

Petroleum Heat and Power Co., Stamford, Conn., announces that an oil-burner sales campaign has been concluded by the company. To overcome the slump of sales during the early months of the year, a "trip around the world flight" for the salesmen was inaugurated. The total quota was set, and also a quota for each salesman, who must travel 19,262 "miles," sell five burners and bring in five oil contracts. Six of the seven Petro sales representatives qualified for rewards. At the conclusion of the campaign it was found that the leading salesman had traveled around the world, was well on the way for a second trip, having covered 45,244 miles, and was leading his nearest opponent by 4935 miles.

Williams Oil-O-Matic Corp., Bloomington, Ill., announces that the Dist-O-Matic oil burner has been approved by the National Board of Underwriters, the New York City Board of Standards and Appeals, and the state inspection boards in Massachusetts and Connecticut.



Floor Type
"Tempervane"

Just as easy as radiator work —and more profitable!

UNIT Heaters are installed without difficulty by any good heating contractor. It is at most, only a two man job. Suspended type units are no heavier than small cast iron radiators. It is not necessary to make any alteration to the building. Steam connections are the same.

Profit opportunities are greater!

"Tempervane" Unit Heaters have more than five times the heating capacity of direct radiation. A particularly good feature is their scientifically designed outlets which permit a natural steamline flow of warmed air in any desired direction—without objectionable drafts! ... An exclusive Sturtevant design.

Why not get more industrial heating contracts by selling the unit idea in your vicinity?

We have a complete catalog which describes both Overhead and Floor Type Unit Heaters. Any branch office will be glad to mail you a copy or cooperate with you in the solution of problems.

B. F. STURTEVANT COMPANY

Plants and Offices at: Berkeley, Cal.•••Camden, N. J.•••Framingham, Mass.•••
Galt, Ontario •••Hyde Park, Mass.•••Sturtevant, Wis.

Branch Offices at: Atlanta; Birmingham; Boston; Buffalo; Camden; Charlotte; Chicago; Cincinnati; Cleveland; Dallas; Denver; Detroit; Hartford; Indianapolis; Kansas City; Los Angeles; Milwaukee; Minneapolis; New York; Omaha; Pittsburgh; Portland; Rochester; St. Louis; San Francisco; Seattle; Washington, D. C., *Canadian Offices at:* Toronto, Montreal and Galt.
Canadian Representative: Kipp Kelly, Ltd., Winnipeg. *Also Agents in Principal Foreign Countries.*

Sturtevant *Tempervane* **Heating Units**

REG. U.S. PAT. OFF.

MORE ••• THAN FIVE ••• TIMES HEATING CAPACITY OF DIRECT RADIATION

Carrier Engineering Corp., Newark, N. J., announces that its general sales offices, in charge of E. T. Murphy, vice-president and general sales manager, formerly located at 39 Cortlandt St., New York, will be moved to the main offices and laboratories at 850 Frelinghuysen Ave., Newark, N. J. The New York territorial sales office, under the direction of E. T. Lyle, remains at 39 Cortlandt Street.

Silent Glow Oil Burner Corp., Hartford, Conn., reports that at the last meeting of the board of directors, Rallston M. Sherman, secretary and treasurer of the company, was elected to the position of executive vice-president. Louis S. Kroto, assistant secretary, was elected assistant treasurer.

Brown Instrument Co., Philadelphia, Pa., has appointed Charles H. Kerr and George W. Keller vice-presidents and general managers.

Westinghouse Electric & Mfg. Co., East Pittsburgh, announces that 1928 was the best year in the history of the company, according to the annual report recently issued. Sales billed for the year were $189,050,302, and net income was $20,814,940, which figures exceed previous records by $3,500,000, and $2,700,000, respectively.

Ric-wiL Co., Cleveland, O., has established two direct factory branch offices: In Chicago, Ill., at 724 Harris Trust Bldg., in charge of R. E. Sutherland, who handled the Ric-wiL account for the Standard Power Equipment Company, and G. Austin, formerly a central station engineer with the Rochester Gas & Electric Company. The Baltimore, Md., office is located at 517 Garrett Building, in charge of L. G. Vance, who handled the company's account with Vance & Vance, acting as manager of its Baltimore branch.

An announcement recently has been made that William M. Cooper has joined the sales force of the company to work under the direction of the New York City office, of which C. W. Lemmerman is manager.

The Aeroil Burner Co., Inc., New York, has established a branch office at 176 North Wacker Drive, Chicago, Ill., and will maintain a stock of heaters and parts at that place.

National Radiator Corp., Johnstown, Pa., held a sales conference February 25-26 at the Benjamin Franklin Hotel, Philadelphia, Pa. R. W. Porter, vice-president, presided at the discussions of business.

Wise Furnace Co., Akron, O., announces the appointment of Ira C. Misner as sales manager of the gas furnace department. Mr. Misner has been associated with the gas industry for over 20 years. Recently he was serving in a sales promotion capacity with the Federal Company of Chicago. A recent announcement also states that two new sizes of the Wise warm-air furnace have been approved by the American Gas Association Laboratory.

Hoffman Specialty Co., Waterbury, Conn., has taken over the sales promotion of the return line vacuum heating pumps made by the Economy Pumping Machinery Co., Chicago.

U. S. Radiator Corp., Detroit, Mich., in its annual report shows that eight manufacturing plants are operated, also 37 branch and sales offices and 32 assembly plants, with assets of $12,217,611 and a net profit of $548,878 for the year ending January 31, 1929.

New England Radiator Co., Boston, Mass., has appointed L. R. Graves, associated with the company for the past 20 years, as manager of the company.

Winslow Boiler & Engineering Co., 844 Rush St., Chicago, Ill., announces the following new dealers: Weaver & Conn, Gulfport, Miss.; King Plumbing Co., Keokuk, Ia.; Fred J. Buckler, Fort Madison, Ia.; Friedel Electric Co., Burlington, Ia.; Lochhead & Jung, Chester, Ill.; Williams Hardware Co., Streator, Ill.; M. G. Crapper, Toronto, Ont.; M. F. Gunderson, Oelwein, Ia.; American Heating Co., New Haven, Conn.; Foster Plumbing Co., La Grange, Ga.; Tom Connell Plumbing Co., Iowa City, Ia.; Kleen-Heet Sales & Service Co., Charleston S. C.

Richmond Radiator Co., 1480 Broadway, New York, in its annual report, shows net earnings for the year of $300,765 or $92,642 in excess of dividend requirements on the preferred stock issued.

Reading Iron Co., Reading, Pa., announces the appointment of E. W. McHenry as district sales representative located at Houston, Tex.

American Radiator Co., 40 East 40th St., New York, announces the appointment of David E. Kennedy and W. M. Cosgrove to the offices of vice-presidents. David E. Kennedy has been connected with the company for 31 years, as salesman, sales superintendent, branch manager, assistant general manager of sales, and for the past six years, manager of the Chicago branch of the company. He will continue, as vice-president, to maintain his headquarters in Chicago. W. M. Cosgrove joined the company 21 years ago, and has served as sales supervisor and manager of the New York branch. He was appointed district vice-president about a year ago. George Maier and Richard B. Mayer were recently appointed as assistants to the general manager in New York.

International Heater Co., Utica, N. Y., has opened a new branch warehouse at Long Branch, N. J., in charge of L. N. Thomas. Mr. Thomas formerly was connected with the Richardson & Boynton Company, and from 1912 to 1918 was traveling representative in New York State for the International Heater Company.

Johns-Manville Corp., New York, has elected Lewis H. Brown president and director of the company to succeed Theodore F. Merseles, whose obituary notice is printed elsewhere in this issue. W. R. Seigle was appointed chairman of the board, succeeding H. E. Manville, who resigned to become chairman of the executive committee.

Preferred Utilities Mfg. Corp., 33 West 60th St., New York, has been appointed as representative for the Dongan Electric Mfg. Co., Detroit, Mich.

Even-Heat Oil Burner Corp., 326 West 48th St., New York, is the exclusive manufacturer and sales agent for the Liberty oil burner, formerly manufactured in Lincoln, Neb. This burner is made in one size to heat five to ten-room homes, completely installed for $395, equipped with Basel valve, Minneapolis control with clock, 275-gal. tank.

Stanley Burner Corp., 6831 Jefferson Ave. East, Detroit, Mich., announces that the Brundage Co., of Kalamazoo, Mich., has been appointed as distributor for the Stanley oil-burning furnace for five counties in Michigan. Another distributor recently appointed is Watson Bros., Port Huron, Mich., to sell the Stanley oil-burning furnace in St. Clair County, Mich.

Changes in Address

Chicago Pump Co., Chicago, announces that its New York office has been moved to larger quarters at 79 Madison Ave., where there will be a complete stock of repair parts and an enlarged service department.

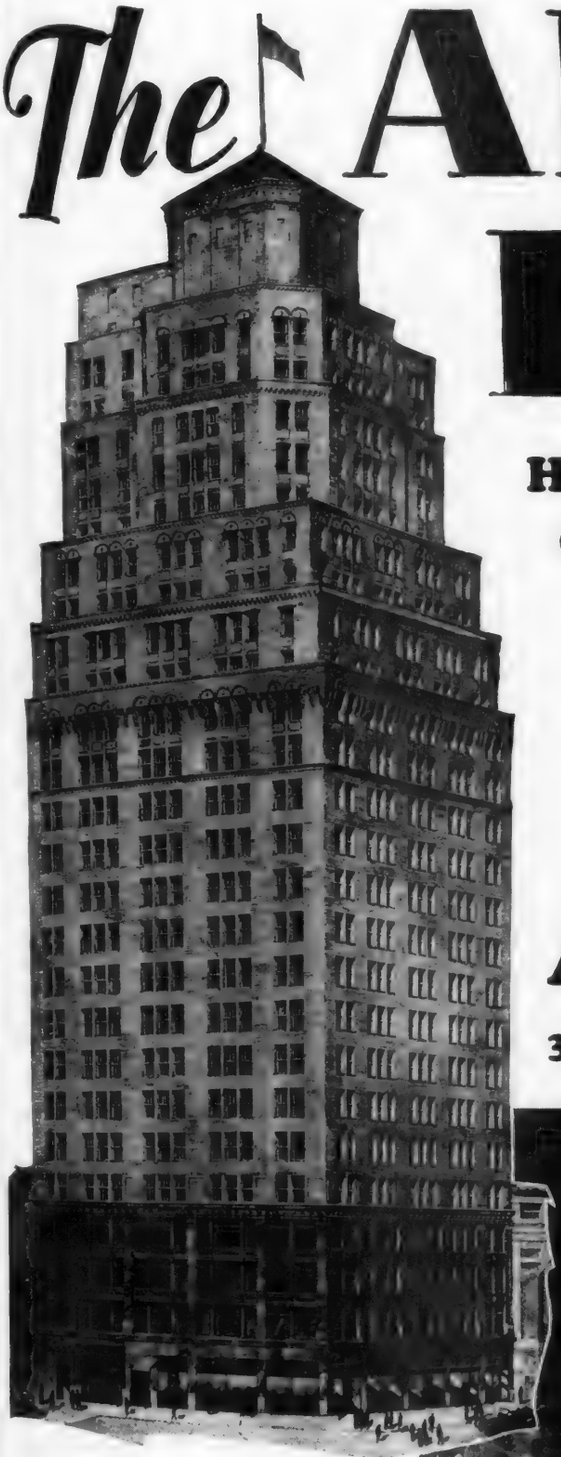
International Engineering & Supply Co., Tower Bldg., St. Louis, has moved to Suite 610-14 First National Life Bldg., Broadway and Chestnut Sts., St. Louis.

Natkin Engineering Co., Kansas City, Mo., has purchased the four-story loft and office building at 314-318 West 10th Street, and moved into its new quarters on April 1. This company specializes in heating, ventilation and refrigeration.

The Frost Mfg. Co., Galesburg, Ill., has moved its Chicago office from 112 West Adams Street to the Builders Bldg., 228 North La Salle Street.

Harry K. Mead, 927 Board of Trade Bldg., Portland, Ore., representative for the C. A. Dunham Company and Pacific Steel Boiler Company, has moved to 1000 Buyers Building, in Portland.

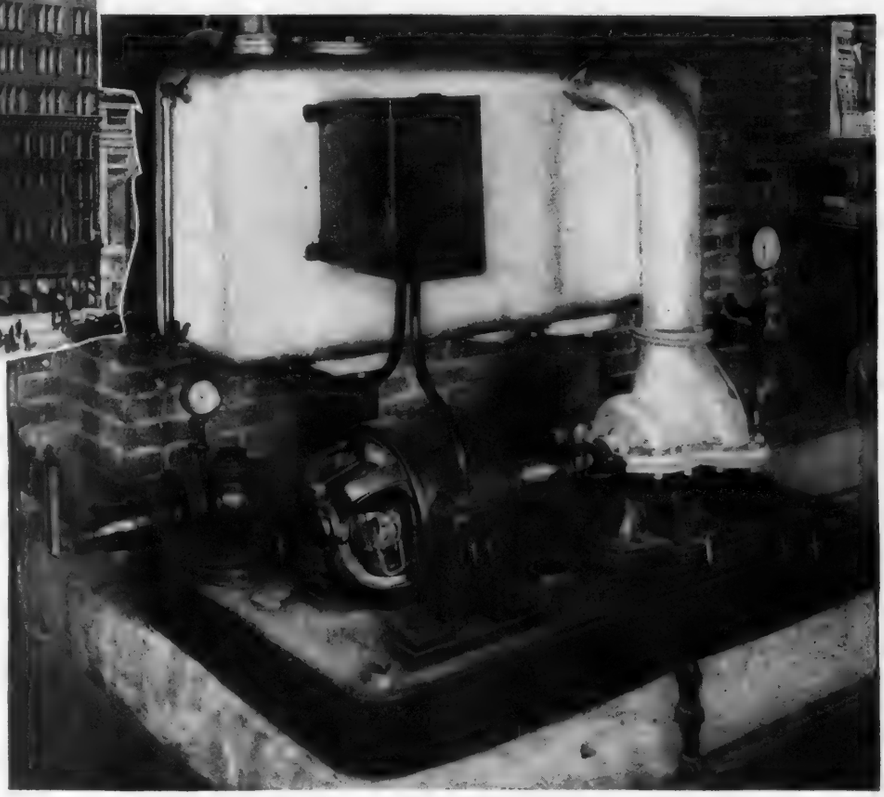
The AMES PUMP



Heart of the Heating System
Greeley Square Building
New York City

Has a Performance Record of Three Years Service—Dependable—And Not a Cent for Repairs.

AMES PUMP COMPANY
INCORPORATED
30 Church Street, New York, N.Y.



Gronenberg & Leuchtag, *Architect*
Almirall & Co., *Contractor*

SALES OFFICES IN PRINCIPAL CITIES

The National Press Building, the most modern and largest privately owned office structure in Washington, D. C.

Architect—C. W. & Geo. L. Rapp, Chicago, Ill.

G. C.—Geo. A. Fuller Co. Munsey Bldg., Washington, D. C.

Structural Engr.—Lieberman & Heim, Chicago, Ill.

Mech. Engr.—Architects.

Heating Contractors—American Mechanical Engineering Corp.

"Buffalo"

Fans installed in Washington's largest and most beautiful office building

The new, modern National Press Office Building of Washington, D. C., represents the best that money and the effort of architects and engineers could possibly provide.

By the use of Buffalo Fans in this $9,000,000 structure, the architect, the engineer and the contractor have assured the owners of dependable, efficient and quiet ventilation.

Let us co-operate with you on your heating and ventilating problems. Branch offices in all principal cities are at your service.

Buffalo Fo

480 Broadw

HEATING, VENTILATING A

In Canada:
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

THE LOS ANGELES HALL OF JUSTICE

Heating Contractor, Howe Brothers, Los Angeles.

Architect, Allied Architects Association of Los Angeles.

"Buffalo" Equipment here also ~

Buffalo Heating and Ventilating Equipment provides the proper atmosphere in many of the new, magnificent buildings recently erected in Los Angeles. By specifying Buffalo Fans and Air Washers, the Engineers and Architects have furnished a system that provides a positive, uniform circulation of fresh air at any desired temperature throughout the building, without drafts,—a system that actually washes the air, saturates and removes every particle of dust.

Buffalo engineers offer exceptionally competent service in supplying adequate heating and ventilating equipment for any type of structure.

Branch offices in all principal cities are at your service.

ge Company

uffalo, N. Y.

ECHANICAL DRAFT APPARATUS

Classified Advertising

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

HEATING AND VENTILATING MAGAZINE—521 5th Ave., New York City.

SALES REPRESENTATIVE WANTED—An excellent opportunity with unlimited financial possibilities, either as direct salesmen or as sales representatives, is offered covering a complete line of vacuum, vapor and steam heating specialties, a complete system of temperature regulation, fans, air washers and unit heaters.

Only those with technical education and thoroughly experienced in one or more of the lines will be considered. Give complete history of selling experience with reference to territory covered, name of company now associated with, etc. Applications confidential.

THE BISHOP & BABCOCK SALES CO.
Cleveland, Ohio

VAPOR SPECIALTY REPRESENTATIVES WANTED—Some territories open at present, particularly in the west and south. Good proposition for established men who have following with plumbing and heating contractors and architects. State territory and other lines handled. Layouts not necessary. We are an old established company. Our heating system is simple and popular. Communications he'd strictly confidential. Address Box 48, care of Heating and Ventilating Magazine.

MANUFACTURER'S REPRESENTATIVE—Manufacturer of complete line of fans, air washers and unit heaters, desires recognized representative on commission basis. Address Box 49, care of Heating and Ventilating Magazine.

SALES ENGINEER—Experienced Mechanical and Heating and Ventilating Engineer desires connection with manufacturer or representative wishing to introduce their product in counties north of New York City. Address Box 45, care of Heating and Ventilating Magazine.

STEAM HEATING REPRESENTATIVE—Public Utility Company in large eastern city has a vacancy for graduate Mechanical Engineer, 21 to 30 years of age, for commercial steam heating sales work. Junior position with good opportunity for advancement. State age, education, experience and salary desired. Address Box 44, care of Heating and Ventilating Magazine.

HOUSE HEATING ENGINEER—To supervise sales and service in connection with the use of gas for house heating. Requirements: College graduate, 32 to 40 years old. At least 5 years' experience in combustion engineering and plant operation; also a thorough knowledge of house heating equipment and systems and of sales promotion work. Give age, education, experience and salary desired at start. Address Box 42, care of Heating and Ventilating Magazine.

SALES REPRESENTATIVES WANTED—Nationally advertised manufacturer of complete line of Unit Heaters wants Sales Representation in Buffalo, Cleveland and Chicago. Address Box 46, care of Heating and Ventilating Magazine.

SALES ENGINEER—Thoroughly reliable and experienced, desires Pittsburgh, Pa., district sales agency for water heaters, condensers, unit heaters and motor driven vacuum pumps. Able to finance all accounts. Address Box 43, care of Heating and Ventilating Magazine.

HEATING & VENTILATING ENGINEER—Technically trained, 12 years practical experience, estimating design, superintendence, and combustion work. Now employed but wish to locate in Philadelphia with heating and ventilating contractor, consulting engineer or concern specializing in combustion devices. Address Box 47, care of Heating and Ventilating Magazine.

BIG BUSINESS SAYS!

"Prepare NOW to reap YOUR share in the coming years of great business Prosperity."

HARKEN to this Command, O Ye Shop Owners, Salesmen, Mechanics, and others. Fortunes will be made in these next few years by those who KNOW. Devote this Summer to personal preparation in a technical way for going after the bigger paying jobs—the ones with the larger yearly incomes. Build big with big prosperity; our Engineering Service is at your command. Check the subject you prefer, and mail today—full information is free.

- ☐ Heating and Ventilating Engineering.
- ☐ Special Steam and Water Heating.
- ☐ Scientific Warm Air Heating.
- ☐ Plumbing and Sanitary Engineering.
- ☐ Contracting and Estimating.
- ☐ Mechanical Drafting.

Saint Louis Technical Institute
Est. 1910.

The most thorough institution for Technical Home Study to-day.

4543 Clayton Avenue St. Louis, Mo.

FOR SALE—Nipple machines from ⅛" to 2". Pipe cutting machines up to 6". Large assortment of steam fittings. Address Box 41, care of Heating and Ventilating Magazine.

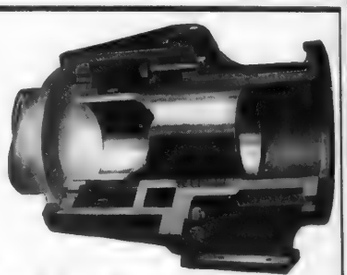
"Sheer Comfort" Automatic Electric Heat Control

Consumer's Price **$38.00** Installed

Write for Prices

H. M. SHEER COMPANY
QUINCY Department HV ILLINOIS

HOWARD Guided Expansion Joint



For Pipe Line Service

Eliminates trouble from Expansion and Contraction, saves space, labor and repair bills; the construction is mechanically correct.

ALBERGER HEATER CO.
HOWARD IRON WORKS
285 Chicago St.
Buffalo, N. Y.

Service The *Satisfaction*

VECO SYSTEM of VAPOR HEATING

Write us about the Building you want to heat—any building, regardless of size, character or location. VECO gives the same good service wherever installed.
— WE GUARANTEE IT —

VAPOR ENGINEERING COMPANY

PHILADELPHIA—10 So. 18th Street
J. Wilbur Glassey—M. S. Buck

NEW YORK—489 Fifth Avenue
Chas. E. Scott—R. C. Willis

The

THERMO SYPHON TRAP

—leaves silence on the job as well as safety

WHEN the heating system goes into operation, it is a comfort to building owner, manager and occupant alike to know that noiseless operation is assured by a THERMO SYPHON TRAP.

Maintenance of water level, too, by these dependable devices is "Life Extension" for boilers, on all vapor, vacuum, atmospheric, and modulation systems .... on one or two pipe steam systems from less than atmospheric up to twenty pounds pressure.

Send for Bulletin No. 16-HV giving full details. We solicit correspondence on heating difficulties.

HIGH GRADE Return, Vacuum, Lifting and Separating Steam Traps, Reducing Valves, Blow-off Valves.

LYTTON MANUFACTURING CORPORATION

FRANKLIN, VIRGINIA

We publish here for the FIRST time

New Autovent Unit Heater
Ceiling type. Angles at top provide means of attaching to ceiling or side wall.

Announcement of New Models of Autovent to be known as

AUTOVENT Super Type Heaters

These heaters of greatly increased capacity are ready for distribution

To the established points of superiority in convenience and efficiency which have always characterized Autovent Unit heaters, are now added further advantages in the latest models as follows:

(1) An improved type of coil whose efficiency adds 50% to the capacity of the new Autovent.

(2) Supply and return connections conveniently located. Steam piping can be brought to either side of heater.

(3) Every inch of coil rendered efficient by air chamber which provides for even distribution.

These features are added to the already proven advantages of (1) Tapered discharge giving direction and high velocity to air leaving heater. (2) Air chamber which evenly distributes air over all parts of coil, making every inch of it effective. (3) Special heavy duty motor with wool packed bearings.

Results: Less floor space—Shorter piping—No dead air at ceiling—Less traps—Less roof radiation. Full data on request.

REGISTERED AUTOVENT

Autovent Unit Heater with recirculating duct for use where high ceilings make floor mounting desirable.

Autovent Fan & Blower Co.
1805-1827 No. Kostner Ave.
CHICAGO, ILL.

Now—

FOR STEAM

RAYMOND

DUO-STAT

(Manufactured in high and low voltage types—no open contact)

Controls
oil
burners
in
steam
systems
automatically
by
the
outdoor
temperature

This is the ideal control for apartment buildings, stores, office buildings and theaters.

Write now for our Bulletin Number Two.

F. I. RAYMOND COMPANY

228 North La Salle St., Chicago, Ill.

THE RAYMOND DUO-STAT

THE ONLY INSTRUMENT OF ITS KIND

THE Raymond Duo-Stat is an entirely new type of thermostatic control which has two bulbs instead of one bulb as in other thermostats. One of these bulbs is placed outdoors and the other is applied to the heating plant.

Both bulbs are connected to the same thermostatic head by fine hollow tubes and act jointly on the instrument to control the heating plant. The outdoor bulb of the Duo-Stat acts automatically to change the temperature in the heating plant at which the fire is turned off and on. Thus the radiators are maintained at a high temperature on cold days and at a low temperature on mild days.

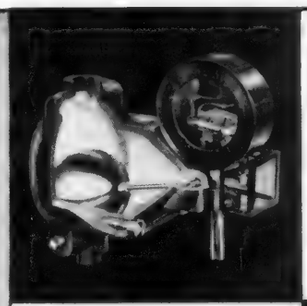
Used alone to control a heating plant the Duo-Stat gives an absolutely uniform heat and remarkably close control of room temperture. Used in conjunction with a room thermostat it controls the room temperature within a fraction of a degree.

Duo-Stat control is fully automatic and extremely simple to install in either old or new buildings. It is admirably suited for the control of zone heating which is finding so much favor in new buildings.

The cost of Duo-Stat control is often but a fraction of the cost of the systems formerly used.

F. I. RAYMOND COMPANY

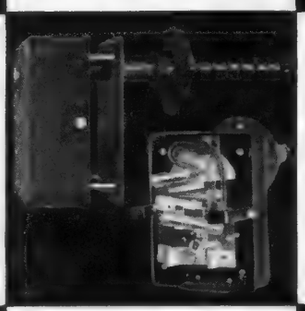
228 North LaSalle St., Chicago, Ill.



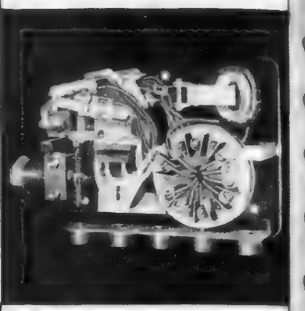
Mercoid Low Water and Pressure Control is designed for the protection of automatically-fired steam boilers, but has various other applications. It prevents firing into dry boilers or building up excess pressure.

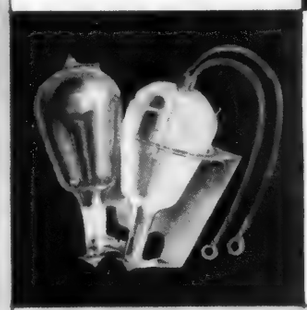
Mercoid Automatic Pressure type Boiler control for all steam units. A positive safety limiting device—widely used as a boiler control with automatic oil burners and automatic coal-burning equipment.

SM Pyratherm is a new stack safety control which combines Type M1 Pyratherm and Type S Adjustatherm making a complete control in itself. It has the gravity locking movement which gives added protection.



The INTERLOCK is the latest development in complete automatic safety controls. For use with domestic and industrial oil burners. Has a variety of applications. It works somewhat parallel with the railroad Interlocking system.



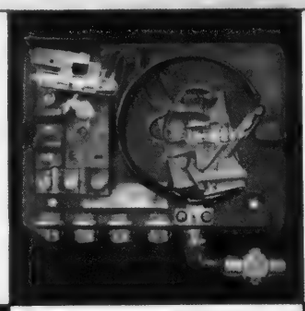


The Visaflame is a safety device, designed to guard against hazardous conditions which may result from failure of flame or ignition.
It allows the burner to operate only in the presence of light from the flame.

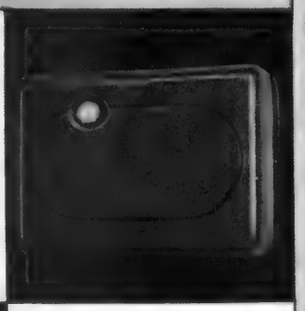
M1 Pyratherm safety control is designed for flue installation. It guards against flame failure.
Has gravity locking movement which affords additional protection in case of a thermostatic coil breakdown.

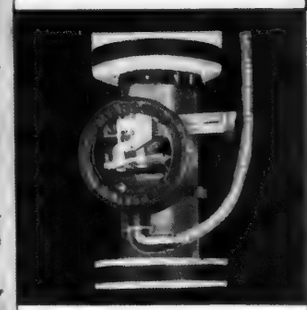
PLAY SAFE WITH MERCOID CONTROLS

Combination Panel Unit SDP consists of Type S Adjustatherm safety cut-out and Type PI ignition control. This instrument is designed to control the ignition period on pressure type burners.

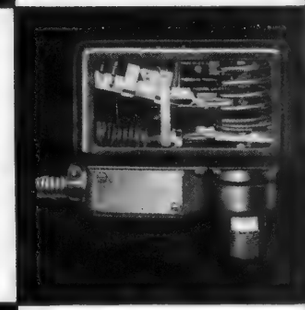


Combination Panel Unit SDE consists of two controls mounted on one panel: the Adjustatherm and Electric Ignition Control. For burners using electrically controlled ignition.
Panel Units also available for other applications.



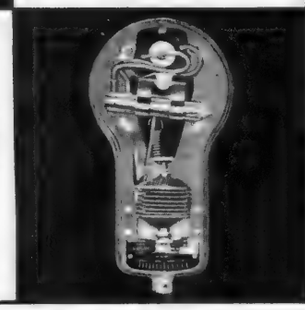


The Risertherm is designed to be clamped on the risers of hot water heating systems or the surfaces of hot water tanks or pipes to regulate the temperature within. Easy to install.



Double Adjustment controls are recommended for conditions where it is desired to maintain a close operating differential over a wide range—with double adjustment feature for regulating the cut-in and cut-out points.

The Mercoid Thermostat is designed for automatic temperature control of oil burners, unit heaters and for other applications where it is desired to control an electric circuit through changes in air temperature.



The Mercoid Immersion type Hot Water Boiler Controls are the correct type of automatic limiting devices to control motor-driven units on hot water boiler installations.
Furnished with straight or back angle stem.

SEE OUR COMPLETE DISPLAY OF MERCOID CONTROLS AT THE OIL BURNER EXPOSITION IN THE HOTEL PENNSYLVANIA NEW YORK CITY APRIL 9-10-11

MERCOID CONTROLS have wended their way to the four corners of the earth. Their unfailing performance and the guarantee back of them have won the confidence of the trade. ¶ Wherever there is a need for dependable oil burner controls – Mercoid is recommended.

THE MERCOID CORPORATION

564 W. ADAMS STREET, CHICAGO, ILL.
25 CHURCH STREET, NEW YORK, N.Y.

MERCOID CONTROLS

When You Are In Chicago

We will be delighted to have you call at our new offices

75 East Wacker Drive
MATHER TOWER BUILDING

HEATING & VENTILATING is pleased to announce that its mid-western staff is now located in new offices in the Mather Tower Building, 75 East Wacker Drive, Chicago, Ill. Together with the staffs of the other fifteen publications which make up NATIONAL TRADE JOURNALS, INC., they are now occupying the entire sixth floor of this beautiful new structure. With all modern facilities now available to make for prompt and efficient service, the HEATING & VENTILATING staff extend a cordial invitation to all their friends to call.

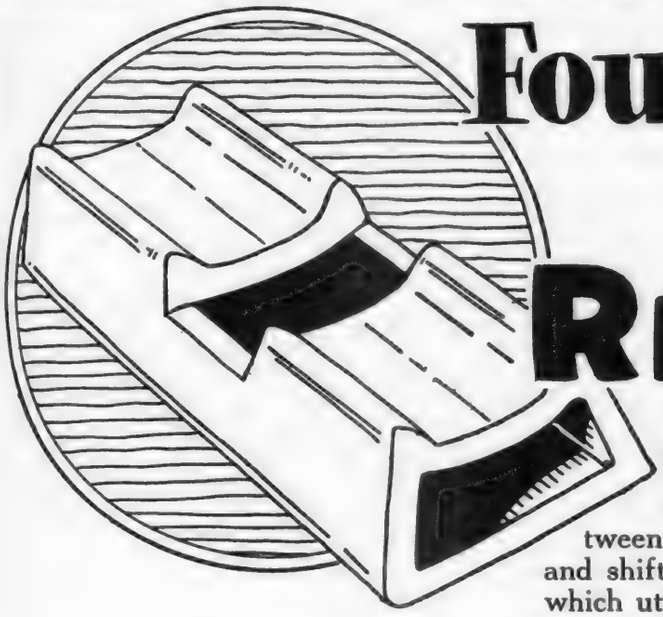
If visitors wish to make our offices their business headquarters while in Chicago, they will be furnished a private office for conferences and with stenographic, telegraphic and mail service to suit their requirements. Delivery of telegrams and mail will receive most careful attention.

As now organized, there are four groups, and a nucleus for a fifth, making up NATIONAL TRADE JOURNALS, INC., each group having their respective staff in these offices. These groups are: National Building Publications; National Food Products Publications; National Diesel Publications; National Sports Publications, and, a National Textile Publication. Specialty Salesman Magazine is also a property of NATIONAL TRADE JOURNALS, INC.

The magazines of NATIONAL BUILDING PUBLICATIONS are: BUILDING AGE, THE ARCHITECTURAL FORUM, HOME BUILDERS' CATALOG, GOOD FURNITURE MAGAZINE, THE HEATING & VENTILATING MAGAZINE.

Mather Tower Building is conveniently located for business visitors to Chicago. HEATING & VENTILATING staff will welcome the opportunity to serve you when you are in Chicago.

There's a *Remarkable* Foundation under RIC-WIL

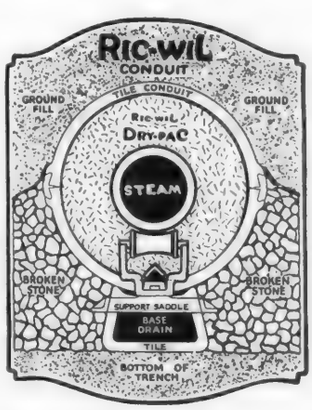


ONE most important difference between ordinary conduit and Ric-wiL is ... the efficiency difference ... between a broken stone foundation which settles and shifts like sand, and the Ric-wiL Base Drain which utilizes the bottom of the trench, a foundation usually as solid as rock—earth packed to immovable density by time and stress.

40% greater strength than ordinary conduit! That's what the Ric-wiL Base Drain gives to Ric-wiL Conduit. You can pound the traffic of Broadway over its back! It's 6 times stronger than farm drain—more than twice the strength of vitrified b.s. Breakdown just can't happen with strength like that. And the unusually large drainage capacity of Ric-wiL Base Drain guarantees a dry trench—always. Even under flood conditions Ric-wiL will not sag—it can't—it's founded on the trench bottom. Nor can water get in to rob the efficiency. The Loc-liP Side Joint dovetails the conduit halves, making a joint that is phenomenally water-tight. Then Dry-paC—Ric-wiL's marvelous conduit filler is absolutely water repellent.

Installation is a 1-2-3 operation—base drain—bottom half—top half. Just as simple as that.

Surely with such emphatic advantages—such high standards of strength, permanency, efficiency—Ric-wiL must be worth your consideration. Tell us your requirements—ask our advice.



Here's definite proof of the strength of Ric-wiL Base Drain—the foundation of Ric-wiL's remarkable efficiency. The James H. Herron Company, Consulting Engineers, Cleveland, Ohio, tested and reported that Ric-wiL Base Drain R H 2, which weighs 55 lbs., is 1-5/16" thick and 2 feet long, has a strength equal to the enormous average crushing stress of 12,194 lbs. The R H 3 Base, that weighs 73 lbs., is 1-9/16" thick and 2 feet long, has the gigantic average crushing resistance of 25,555 lbs. No underground condition would subject it to such stress.

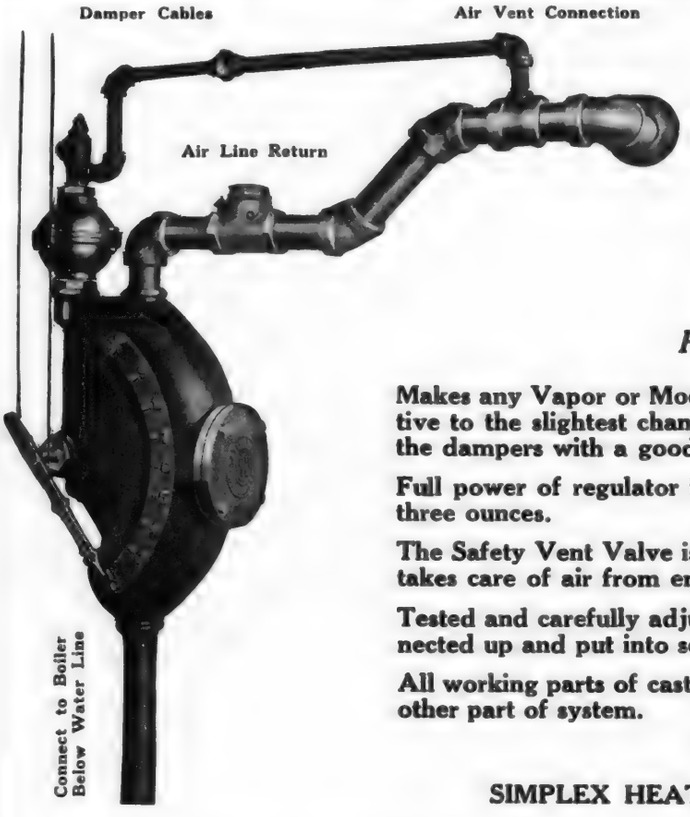
The Ric-wiL Company

1567 Union Trust Bldg., Cleveland, Ohio

Originators of Waterproof Conduit Filler

RIC-WIL

UNDERGROUND CONDUIT



Wiley

Safety-Vent Vapor Regulator

POWER IS ITS MIDDLE NAME

Makes any Vapor or Modulating System safe and satisfactory. Sensitive to the slightest change in pressure. Has ample power to control the dampers with a good working margin.

Full power of regulator is exerted within a pressure range of two or three ounces.

The Safety Vent Valve is a distinguishing feature of this regulator and takes care of air from entire heating system.

Tested and carefully adjusted before leaving factory, ready to be connected up and put into service, with the least trouble and expense.

All working parts of cast bronze. Will last as long as the boiler, or any other part of system.

Write for details

SIMPLEX HEATING SPECIALTY COMPANY, Inc.
LYNCHBURG, VA.

"Below water line" Paracoil installations are a development of domestic water heating engineering that is attracting the favorable attention of owners, architects and engineers. For both large and small buildings.

Send for list of prominent installations and full descriptive data.

DAVIS ENGINEERING CORP.
90 West St., New York City

Paracoil
WATER HEATERS

DICKINSON ALL-CAST-IRON EXHAUST HEAD

Prevents oil and water content of the exhaust system from escaping and falling upon the roof, which otherwise would bring about a condition of decay and disintegration.

Dickinson Exhaust Heads will last as long as the average building.

Made of All-Cast-Iron

ÆOLUS DICKINSON
3336-44 So. Artesian Ave. CHICAGO
(Some territory open for agents)

CONTROL THE SPEED
OF YOUR VENTILATING EQUIPMENT!
REGULATE WARM AND COLD AIR VOLUME
WITH THE TIME TESTED
HORTON
VARIABLE SPEED
PULLEY

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MINNEAPOLIS REFERENCES
Morgan-Gerrish Co. Richardson-Boynton Co. Herman Cook Co.
American Foundry & Furnace Co., St. Paul

ARCOBLAST
SURFACE FOR UNIT HEATERS

The choice of many leading
UNIT HEATER MANUFACTURERS
because of these outstanding features

Rugged Unit Design
No soldered Steam-backed Joints
Non-corrosive
Ample Tube Steam Carrying Capacity
Minimum Weight without Impairing Strength

AMERICAN RADIATOR COMPANY

816 South Michigan Avenue, Chicago 40 West 40th Street, New York

SLOW Speed
Long Life
QUIET OPERATION

Quiet operation is vital in every ventilating system . . . long life always pays dividends . . . The Sirocco Fan, as improved and refined over a period of thirty years, has always been built on the slow speed principle. It delivers more air per revolution than any other type fan of the same size. In addition to quiet operation, slow speed means freedom from vibration, long life and dependable operation. Complete catalog and technical data may be obtained from any American Blower Branch Office . . . without obligation.

The Sirocco FAN

Standard of the World

AMERICAN BLOWER CORPORATION, DETROIT, MICH.
CANADIAN SIROCCO CO., LIMITED, WINDSOR, ONT.
BRANCH OFFICES IN ALL PRINCIPAL CITIES

American Blower

"Sirocco" VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT
MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

Remember! Armstrong traps for those unit heaters

DON'T overlook that problem of draining unit heaters. Condensate and air unless completely removed will decrease the capacity and efficiency of the heater units, and will cause a lot of trouble and grief. You can avoid all of this by installing Armstrong Traps under the unit heaters, and assure yourself of a successful job.

Armstrong Traps keep unit heaters at their maximum efficiency. They drain all the condensate regardless of temperatures. No air valve is needed with the Armstrong.

Accumulated air and gases are discharged with the condensate. They are water sealed at all times against the leakage of live steam. Armstrong Traps have a large capacity for their small size. Heat-treated chrome steel valves and sturdy construction of all parts give trouble-free operation for a period of years.

There are thousands of Armstrong Traps in use in hundreds of industries. If you don't know how good they are, ask the first user you meet—then on your next job remember—Armstrong Traps for those unit heaters.

ARMSTRONG MACHINE WORKS
346 Maple St., THREE RIVERS, MICH.
District Representatives in 40 Cities

ARMSTRONG "INVERTED BUCKET" STEAM TRAP

H & V 4-Gray

ANNOUNCEMENT

THE *American Air Filter Company, Inc.* has acquired thirty-nine [39] Foreign and U. S. Patents and fifty-nine [59] Applications for Patents now pending, covering Unit and Automatic Air Filters of both the Dry and Viscous types, and has licensed the following manufacturers, under these applications and patents:

GENERAL AIR FILTER CORPORATION

ACE

MIDWEST AIR FILTERS, *Inc.*

MIDWEST

NATIONAL AIR FILTER COMPANY

NATIONAL AIR FILTERS NATIONAL

REED AIR FILTER COMPANY

Reed Air filters

The above Companies will operate as individual organizations as in the past but thru a centralized research department will have available engineering and development resources for the perfection of their products which would have been impossible for each to employ separately.

AMERICAN AIR FILTER COMPANY, *Inc.*

LOUISVILLE, KY. BRADFORD, PA.

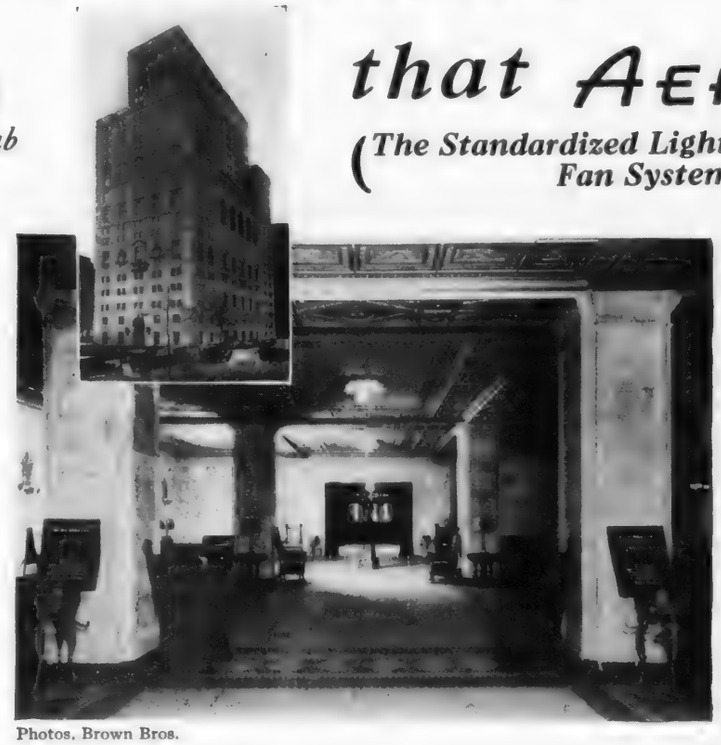
—further evidence

that AEROFIN

(The Standardized Light-Weight Fan System Heat-Surface)

is used by the best for the best

New York Athletic Club



Photos, Brown Bros.

YORK & SAWYER
Architects

CLYDE R. PLACE
Consulting Engineer

CHAS. T. WILLS, INC.
General Contractor

ALMIRALL & Co.
Heating Contractors

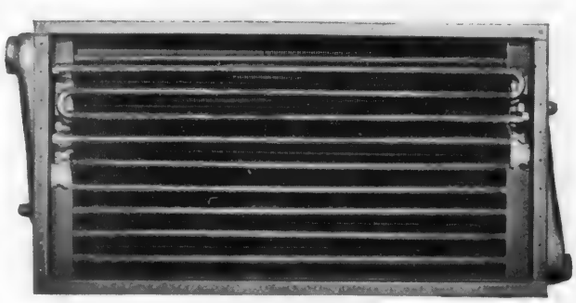
AMERICAN BLOWER CO.
Fan System Apparatus

AEROFIN's standardized encased unit construction, light-weight, and extraordinary compactness not only make possible, but inspire a finished installation in keeping with the finest modern Architecture and Engineering. The fact that AEROFIN's installed cost is less than heavier, bulkier, corrosive surface is fortunate but far less important.

Write to Our Newark Office for Piping Diagrams and Detail Information on any or all Types.

AEROFIN (Low Pressure), Tube-Plate Construction, for pressures up to 50 lbs. gauge.

AEROFIN (Universal), continuous seamless tubes, multiple-coil construction, for pressures from 2½ to 150 lbs. gauge. (Illustrated.)



AEROFIN (High Pressure), continuous seamless tubes, for pressures from 25 to 350 lbs. gauge (Temp. 500° F.)

All Units in standardized steel Casings, ready for Pipe and Duct connections

Manufactured by

AEROFIN CORPORATION

850 Frelinghuysen Avenue, NEWARK, N. J.
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Burnham Building
CHICAGO

Land Title Building
PHILADELPHIA

United Artists Building
DETROIT

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PITTSBURGH

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ST. LOUIS

AEROFIN is sold only by Manufacturers of nationally advertised Fan Heating Apparatus

25 YEARS

without one instance of failure

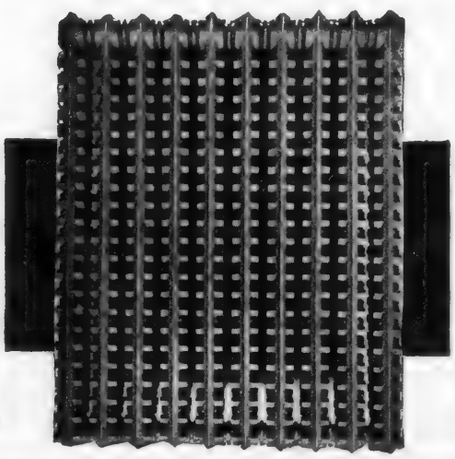
THIS is the remarkable record of Vento Cast Iron Heaters and one of the reasons why this heating surface is almost always the choice of leading engineers and architects.

Another reason for the widespread endorsement of Vento is its low cost. The superior qualities of Vento cost no more. A review of a number of representative bids show the net installed cost to be invariably in favor of Vento.

Vento Heaters are made of high quality close-grained cast iron that will not deteriorate under the action of air, gases, water or summer dampness. The durability of Vento is actually unlimited. Its life is longer than that of the building.

VENTO

CAST IRON HEATERS



SEND FOR CATALOG

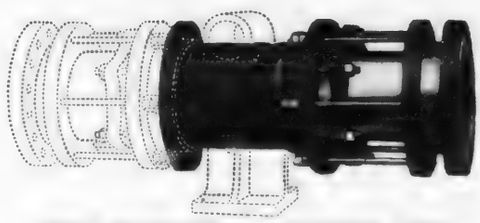
We will send you without obligation a Vento catalog containing complete engineering data—just send us your name and address.

AMERICAN RADIATOR COMPANY

40 West 40th Street, New York 816 So. Michigan Ave., Chicago, Ill.

Specialists in District Heating

Equipment for Underground Steam Lines



ADSCO SEMI-GUIDED EXPANSION JOINT

For 4, 6, 8, 10 and 12" traverse, 125 and 250 lbs. pressure. Extensively used in high and low pressure lines where external guide is not required.

Take a Tip From Ford Motor Company

The fact that Ford selected ADSCO Expansion Joints for its steam lines is the greatest possible tribute to ADSCO equipment.

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As pioneer in the distribution of steam from a central source ADSCO is widely regarded as *the* authority on all subjects pertaining to distribution of liquids and gases through pipe lines. The knowledge and experience acquired over a period of fifty years is available to you through our Engineering Department — which will be glad to cooperate with you in the designing of pipe lines for any purpose.

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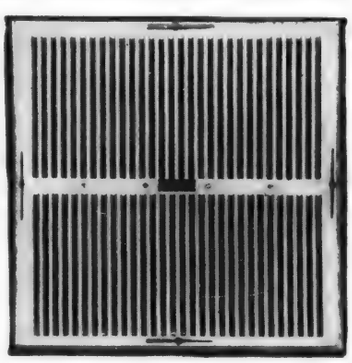

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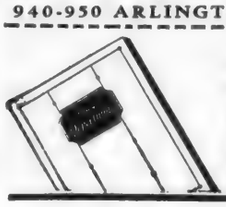

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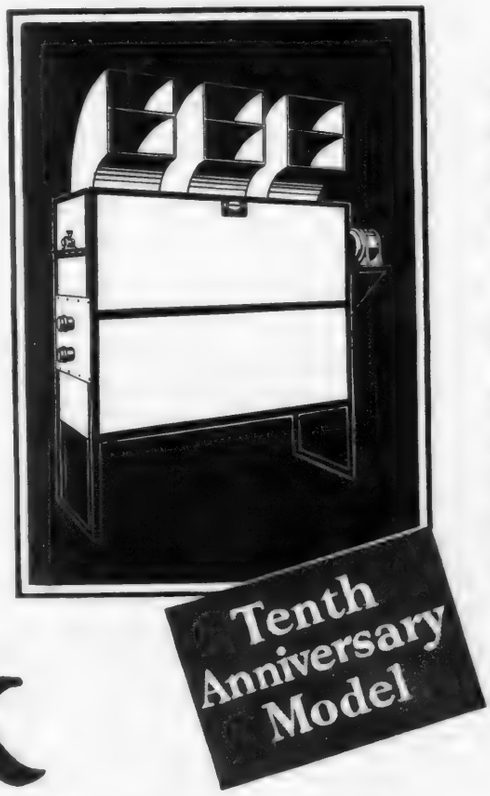

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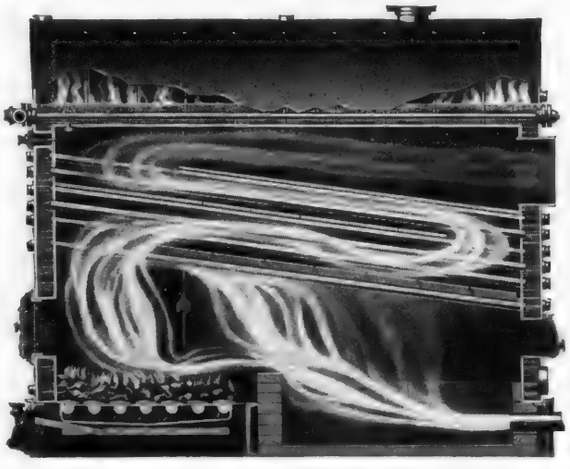

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Duriron, a cast metal alloy, is highly resistant to all corrosive fumes and condensate, and fans made of this metal are wholly immune to corrosive attack.

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HOT air that follows its natural course and rises to the roof is a great source of waste. It accumulates in a highly overheated mass overhead where it serves no purpose, but increases the loss of heat from the building into the outer air.

Wing Featherweight Unit Heaters by delivering the air they heat to the working level *first,* reduce heat losses to a minimum and warm the whole building more uniformly.

100% Overhead Heating

Wing Featherweight Unit Heaters give you *all* the advantages of overhead heating.

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(4) Their powerful Scruplex Fan insures the heated air reaching the working level.

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A frictionless bellows pump of high vacuum with a dependable delivery far in excess of any domestic requirements.

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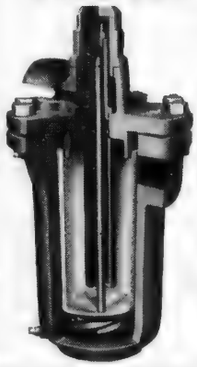

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ANY FINISH — ANY PERIOD

For every type and size radiator
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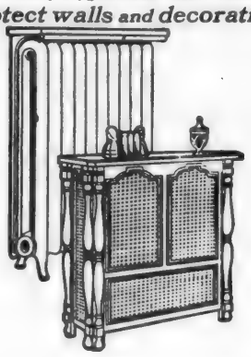

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recognize the value of this line which can usually be sold when the original contracts for new work are signed. In slack seasons, gives salesmen something to work with on older installations.

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Built Like King Tut's Statue—

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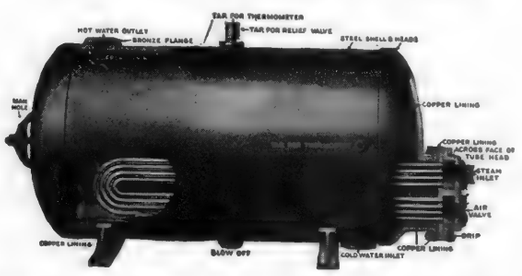
The copper lining makes them last for ages and eliminates rust.

Water does not come in contact with anything except copper. Corrosion and rust are therefore impossible. *We guarantee these heaters to prevent discoloration of water from rust.*

Patterson Indestructo Heaters have complete copper lining re-enforced by the steel shell, thus also adding to the strength.

Patterson Copper-Lined Heaters in use for more than 18 years show no sign of wear. Write for Catalog and Prices.



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No cooling leg required
Cannot freeze
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Only one moving part

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PEERVENT

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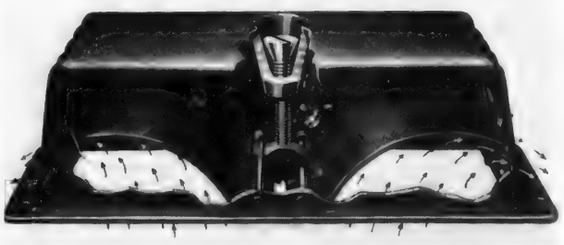

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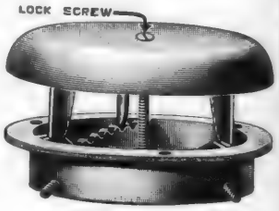

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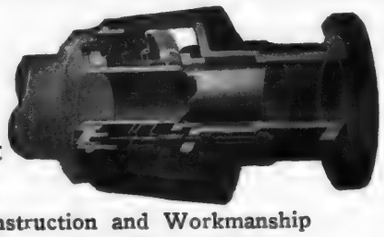

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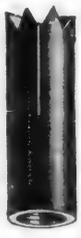

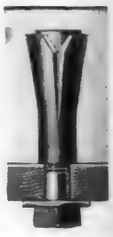

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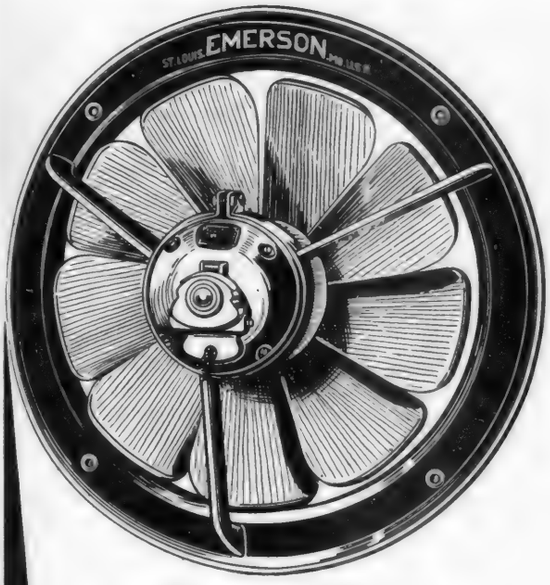

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The new ventilating device securing the perfect protection of the motor from:

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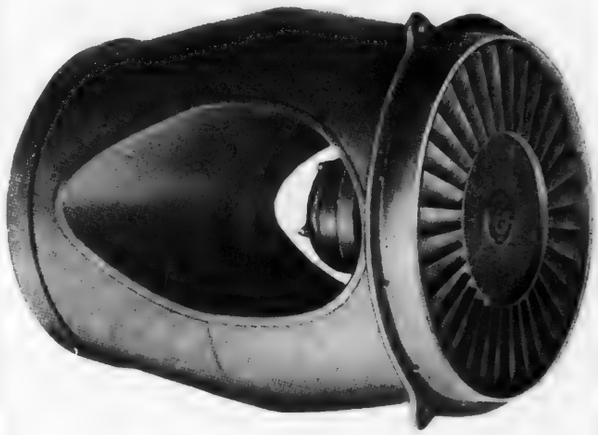
No extended shaft used nor bending of ducts necessary.



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For special ventilating jobs where fumes of excessive temperature or corrosive character are to be removed. The bifurcator is a device that permits the use of a *straightway duct.* It eliminates right angle bends and long shaft connections, at the same time protecting and automatically cooling the motor. A *short shaft* connects the fan to the motor, which is located in a transverse opening through the duct. The fan chamber is *stream lined in* section, and the *bifurcated duct is not reduced in area at this point. Full details on request.*

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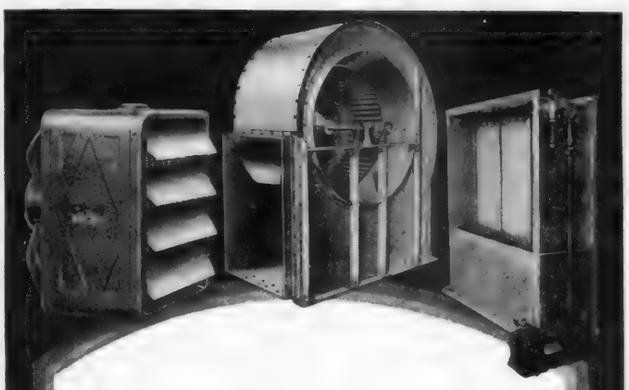

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Our new catalog 105 on Unit-Heaters is just off the press. May we send you a copy? Address 3151 Shields Ave. Chicago

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for small stores, workrooms and everywhere that silence is necessary

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Drug store heated with New Type "V" Twinfan Unit Heaters, silent in operation and concealed behind grills.

The new Type "V" Twinfan (for small heating installations) as well as standard Twinfan Unit Heaters may be equipped with special slow speed motors which are practically silent and combine all other Twinfan features.

Write for descriptive bulletins containing accurate capacity and efficiency tables.

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Dependable—Non-Corrosive —Efficient

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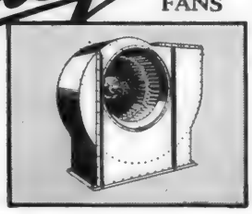
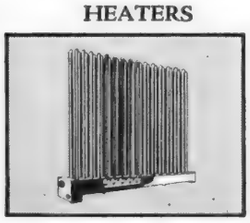
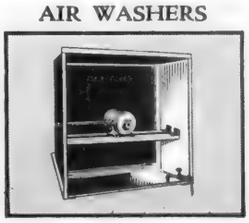
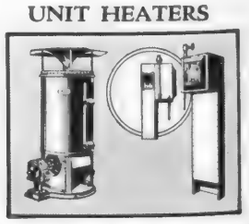
Established 1883

FANS


HEATERS


AIR WASHERS


UNIT HEATERS


HEATING — VENTILATING — AIR CONDITIONING — PROCESS DRYING — MECHANICAL DRAFT — EXHAUST

MASTER HEAT REGULATOR

Sales Constantly Gaining

HEAT regulating has taken a long step ahead with the introduction of the MASTER Heat Regulator. It is easy to sell and constantly gaining in popularity, due toits better,exclusive features.

Closer, more accurate regulation —gradual operation of valves or dampers.

Thermostat shows position of valves or dampers at all times, thus indicating to the user the condition of the fire.

Full Electric Motor

For coal, gas or oil—in any heating system or combination. Clock or plain models. *Sell the latest and best. Write for complete details.*

W-M-C Water Thermostats

For hot water heating systems — accurate, dependable and inexpensive. Easily installed without drawing the boiler or interfering with fire.

Write for details.

White Mfg. Co.

2362 University Avenue
St. Paul, Minn.

Young Unit Heaters are equipped, when specified, with special brackets for auxiliary support where it is not desirable to suspend unit from steam pipes or where state law makes a double support necessary.

A Sensation!

Judge for yourself: This is what an interested observer during the recent Power Show at the Coliseum, Chicago, says:

"We were flattered by the large attendance at our booth, especially by the large number of competitive salesmen and engineers, some of whom came equipped with calipers and rules to inspect and measure the cut-away cross section of the Young Unit Heater. They all marveled at the enormous volume and high velocity of heated air delivered by a unit so small and compact —and some were frank enough to tell us so."

The delivery of this large volume of heated air at high velocity is due to the special construction of our Condenser, which consists of flattened vertical seamless copper tubes with horizontal rows of flat copper fins, pitched slightly downward. Young Unit Heaters assure a greater volume of "useful" heated air in the working zone and deliver more B. T. U.'s per dollar.

Write for our Bulletin H-108

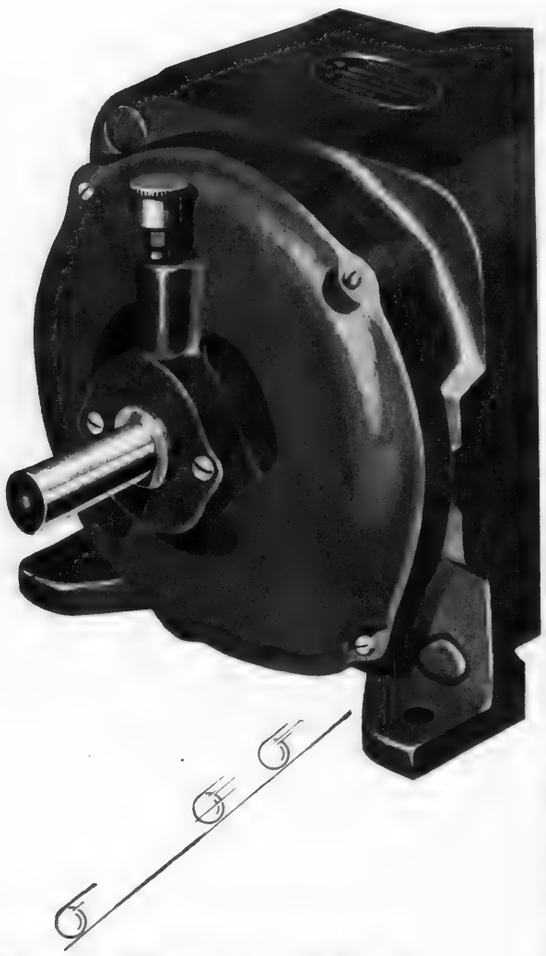
YOUNG RADIATOR COMPANY

Heating Division
RACINE WISCONSIN
Representatives in Principal Cities

Young Quality

©Y. R. Co. UNIT HEATERS

BUILT FOR ENDURANCE AND MAXIMUM PERFORMANCE



Heat Controlled By A Switch

Motor speed regulates heat. The new adjustable Variable Speed Baldor Motor, and the Baldor Controller, makes heat control possible. Unit heaters so equipped bring up or lower the temperature of buildings more quickly than with any other type of equipment. Regardless of temperature fluctuations outside of buildings, even temperature within is easily held with this equipment.

Thousands of unit heaters equipped with adjustable variable speed Baldor Motors, operating at a maximum speed of 850 RPM, 1100 RPM, 1700 RPM and 3400 RPM can be quickly regulated to obtain 40%, 60%, 80% and maximum speed. Send for Bulletin that tells how and why this motor and controller has revolutionized the unit heater industry. The Baldor Electric Company—4356 Duncan Ave.—St. Louis, Missouri.

BALDOR

A BETTER MOTOR

Tubing Is Tubing?

Correct dies, tested raw stock and scientific annealing can make a greater difference in the value of a tube than there is in the usual range of quotations.

We Want to Quote Where Quality Counts

WOLVERINE TUBE CO.

SEAMLESS COPPER BRASS & ALUMINUM

1415 Central Ave., Detroit, Michigan

Sales Offices: Cleveland; Chicago; Atlanta; Los Angeles; Denver; Dayton, Ohio; New York City; Dallas, Texas.

CON-TAC-TOR Controls *at the* Oil Burner Show

Booths 33-34-35
April 9, 10, and 11

Hotel Pennsylvania
New York City

Our exhibit at the American Oil Burner Association Convention will be our first opportunity to present to the industry Con-Tac-Tor controls as the product of Time-O-Stat Controls Company.

We respectfully offer this exhibit as an indication of what may be expected from this new company. There will be a new improved Lockswitch, new thermoswitches and other important developments. You will find our entire line considerably improved in appearance as well as in engineering.

We want the industry to look to Time-O-Stat for the finest, most accurate and most reliable automatic controls it is possible to build. You are cordially invited to visit our exhibit as a means of getting acquainted with the results of our efforts.

TIME-O-STAT CONTROLS COMPANY
ELKHART, INDIANA

Successor to
Absolute Con-Tac-Tor Corporation
Time-O-Stat Corporation
Cramblet Engineering Corporation
Leachwood Company

Manufacturers of AUTOMATIC CONTROLS *for*
Oil Burners - Gas Burners - Electric Refrigerators - Mechanical Stokers - Furnace Fans
Industrial Ovens - Ice Machines - Unit Heaters - Water Heaters - *Also* Sign Flashers
Mercury Switches - Electric Heaters - Corrugated Metal Bellows

—WANTED—

EXCLUSIVE DISTRIBUTORS AND DEALERS *In Every Town for*

"GUARDIAN"

Automatic Electric Heat Control

DISTRIBUTORS' PRICE
$20.00
DEALERS' PRICE
$25.00
RETAIL PRICE
$50.00

Built Right — Beautiful Finish—Handy Dial for Setting—Exclusive Features - A Profitable Proposition for the Trade.

Send for Our Demonstrating Board

Handy Demonstration Board for Salesmen's Use in the Home

TEMPERATURE CONTROL CORP.
Engineering Bldg. Executive Offices: **CHICAGO, ILL.**

CENTRAL STATION STEAM CO.

2912 East Woodbridge St.
DETROIT, MICHIGAN

MANUFACTURERS OF

Cadillac Condensation Meters
Detroit Feed Water Meters

Packingless Expansion Joints and other special fittings for underground steam distribution mains.

THERMOSTATIC METAL

The most accurate, constant and durable of expansion units

FOR LOW AND HIGH TEMPERATURES

Our No. 1800 metal for temperatures up to 350° F.
Our No. 2800 metal for temperatures up to 1500° F.

Positive and Dependable Thermostatic Metals

W. M. CHACE VALVE COMPANY
1600 Beard Avenue
Detroit, Michigan

MANUFACTURED WEATHER

Carrier
AIR CONDITIONING
DRYING
REFRIGERATION

See our detailed data in A. S. H. & V. E. Guide.

makes

"Every day a *good* day"
Air Conditioning

Humidification, Dehumidification
Centrifugal Refrigeration
Cooling of Public and Industrial Buildings
Temperature and Humidity Control

DRYING AND PROCESSING

Carrier Engineering Corporation

Offices and Laboratories
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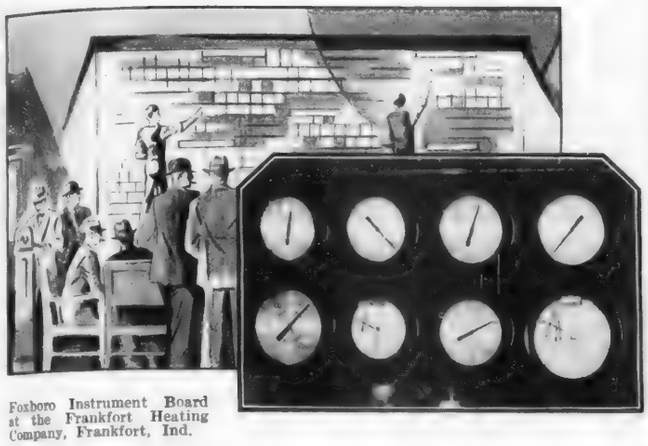
Literature on request. Write concerning your specific problem.

CONSULT PAGES

170—172—174—176

ENGINEERS' SPECIFICATION INDEX



Foxboro Instrument Board at the Frankfort Heating Company, Frankfort, Ind.

Stock Board or Instrument Board

UP-to-the-minute information is essential to the stock broker and the boiler room engineer. In the broker's office the tickers click off figures of sales, and immediately they are posted on the board.

In the boiler room, Foxboro Instruments carry the latest bits of information from critical points even in remote corners to a centralized Instrument Board. Immediate records are made of the operation of each process in the plant right before the eyes of the engineer.

Such a comprehensive view of his plant guides the engineer to more efficient and economical operation.

A Foxboro Engineer will tell you how Foxboro Guaranteed Instruments will save money in your plant. Write the nearest Foxboro Branch today.

The Foxboro Seal, attached to each Recording and Controlling Instrument guarantees workmanship, material and permanence of calibration.

THE FOXBORO COMPANY

Neponset Avenue, Foxboro, Mass., U.S.A.

New York Chicago Philadelphia Boston Pittsburgh
Detroit Cleveland Tulsa Rochester, N. Y. Atlanta
San Francisco Salt Lake City Dallas Los Angeles Portland, Ore.

AUSTRALIA—Alfred Snashall, Ltd., Sydney & Melbourne.

FOXBORO

REG. U. S. PAT. OFF.

THE COMPASS OF INDUSTRY

Instruments for Controlling, Recording and Indicating Temperature. Flow, Humidity and Pressure.

Hot Water Supply Temperature Control

with

WHERE hot water supply is furnished by a heater separate from the heating boilers, temperature control of water by draft regulation is exceedingly practical with National Type F Metaphram Damper Regulators.

The Type F Regulator is installed in flow line leading from heater to tank and connected to draft and check dampers.

Thermostatic action of the regulator gives gradual, constant control to draft and check dampers, resulting in automatic fire control to meet hot water demands, and what is possibly more important—excess temperature of hot water supply is eliminated entirely.

A profitable field of installation is to be found among apartments, apartment hotels, industrial plants, country clubs, etc.

We will gladly send you installation details covering this application of the Type F Regulator.

NATIONAL

National Systems of Heat Regulation and Humidity Control, Metaphram Dampers, Metaphram Motors, Industrial Thermostatic Devices, A-Jacks Steam Damper Regulator for high pressure boilers, Metaphram Damper Regulators for domestic steam, vapor, vacuum and hot water heating boilers, Metaphram Furnace Regulators.

METAPHRAM

NATIONAL REGULATOR CO.
2309 Knox Avenue Chicago, Ill.

NATIONAL REGULATOR CO., 2309 Knox Ave., Chicago.

Send us installation details of Type F Damper Regulators for domestic water heaters.

Name.....

Address.....

Town.....**State**.....

Nugent Crank Case Fuel Oil Filter

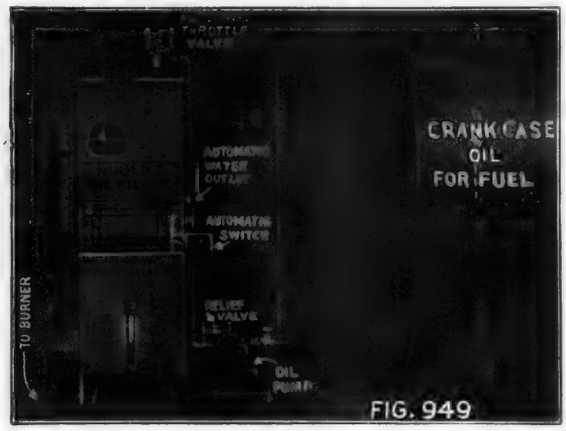


FIG. 949

HEAT YOUR BUILDING WITHOUT COST
BY BURNING DISCARDED CRANK CASE OIL
NO MORE BURNER TROUBLE
Write for catalog

WM. W. NUGENT & COMPANY
409 N. Hermitage Ave., Chicago, U. S. A.
Builders since 1897 of
Oiling Systems — Oiling Devices
Oil Filters — Oil Pumps

Easy to install.

Just break the Oil Burner Suction Pipe and set it in.

They are shipped all assembled ready for use.

Only two connections to make.

Read this Letter

MONARCH GARAGE
1122-1130 HOLLYWOOD AVENUE AT THE L
CHICAGO, ILL.

Wm. W. Nugent & Co.
Chicago, Ill.

December 19, 1927.

Gentlemen:-

About a year and a half ago we purchased from you a Nugent Oil Filter and motor driven oil pump to filter automobile crank case oil for our oil burner.

This purchase has been one of the best investments we ever made, because the apparatus paid for itself in less than three months. We operate our burner on the filtered crank case oil entirely, consequently we have no fuel bills.

The filter removes the water, dirt, grit, and carbon from the oil so efficiently that the fine mesh strainer at the burner never has to be cleaned, and the burner operates perfectly.

Cleaning the filter requires only ten minutes twice a week and there is no other upkeep to the filter, as the filtering elements will last for years without renewing.

We are very pleased with the filter and pump as well as the service you have given us. We highly recommend your apparatus to anyone.

Very truly yours,

MONARCH GARAGE
By E. L. Folk

Low Cost Hot Water for Summer Use

The New Haven Country Club gets satisfactory service from a No. 20 National Heater

Best suited to Country Clubs, Yacht Clubs, Golf Clubs, Apartments, Small Hotels

Here are the heaters best suited for summer hot water supply in clubs, apartments, large residences, small hotels. Depend on them for steaming hot water 24 hrs. a day—at low cost. Large double-wound copper coil gives rapid circulation. Fired with coal twice daily. No. 16 with red vitreous enamel jacket; No. 20 gray japanned. For clubs, apartments, etc., install No. 16. Large capacity jobs, use No. 20.

Write for illustrated bulletin and prices.

No. 20 Specifications

Height	45"
Diameter Fire Pot	18"
Size of Smoke Pipe	7"
Diameter of Top	24"
Flow and Return	2½"
Tank Capacity—Gals.	600
Temp. Rise Per Hour	20°
Square Feet Radiation	400
Shipping Weight	480 lbs.

NATIONAL
MULTI-FLOW TANK HEATERS

THE NATIONAL PIPE BENDING CO., 120 River St., New Haven Conn., Boston, New York, Phila.

The Greater Efficiency of a PEERLESS COAL BOILER

carries satisfaction to every job

—because they are rugged and reliable.

—because they are especially economical to operate.

—because they are carefully tested and honestly rated.

Every Heating Contractor wants to sell satisfaction with each job.

If you can count on every installation giving satisfaction, you can count out complaints and back calls. You can count your *profit* from the initial price of the boiler without making allowances for the deductions that follow in the wake of less efficient installations.

Peerless prices are attractive. Deliveries are prompt.

Write for Catalogue and Price Sheets.

THE PEERLESS HEATER CO.

BOYERTOWN, PA.

Simplicity

JOHNSTON steel heating boilers are simple in design. They are of the firebox type; the fire surrounded by a waterwall and the products of combustion passing rearward into a large combustion chamber; from there into the first pass of tubes to the front and back through the second pass of tubes to the rear smoke connection.

Tubes may be inspected or replaced from either end. Boiler is self-contained, requiring no brickwork or complicated assembly.

JOHNSTON *Steel Heating* BOILERS

Here are the outstanding points about Johnston Boilers:

1. **Substantial construction**
2. **Efficient operation**
3. **Built to A.S.M.E. standards**
4. **Simplicity of design**
5. **60 years' boiler building experience**
6. **Fully guaranteed**

JOHNSTON BROTHERS, Inc.

FERRYSBURG, MICHIGAN

JOHNSTON BROTHERS, Inc.,
Ferrysburg, Michigan.

Gentlemen:

Send me a copy of your Bulletin illustrating and describing completely your Steel Heating Boilers.

Name.....

Address.....

City.....State.....

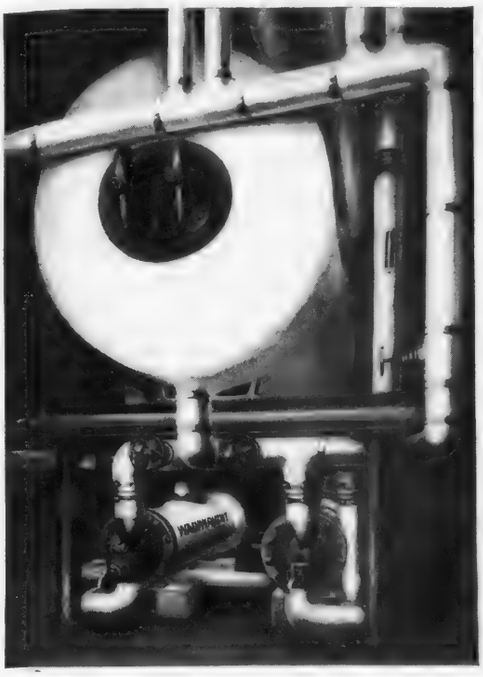
To Help You
Locate Competent Men

¶ Manufacturers, desiring to secure experienced men for their organization, will find a fine response to their advertisement in the Classified Section of Heating and Ventilating Magazine.

To Help You
Locate a Good Position

¶ Each month the Classified Section of Heating and Ventilating Magazine carries some splendid opportunities for men interested in the heating and ventilating field. Use the Classified Section of Heating and Ventilating when you consider making a new connection.

Classified Advertising in Heating and Ventilating Magazine—will solve your employment problems. See page 128.



Wainwright hot water heaters may be used with or without storage tanks. The heaters are built in vertical or horizontal types and installed as space conditions permit.

A Reliable Hot Water Supply

Two Wainwright heaters, with storage tank above, as shown in the accompanying photograph, are used to supply hot water in a large institution. This service includes supplying with hot water, the kitchens, laundry, showers and a swimming pool.

The Wainwright heaters are of the floating head, instantaneous type. Either live or exhaust steam may be used for heating the water.

FOSTER WHEELER CORPORATION

165 Broadway, New York, N. Y.

Branches in Principal Cities

Foreign Associates:—
Foster Wheeler Limited; London, England.
Foster Wheeler Limited; Toronto-Montreal-Vancouver, Canada.

AIRO UNIT COAL PULVERIZERS
AIR HEATERS CENTRIFUGAL PUMPS
CONDENSERS COOLING TOWERS
ECONOMIZERS EVAPORATORS
EXPANSION JOINTS FEED WATER HEATERS

FOSTER WHEELER

FRACTIONATING TOWERS HEAT EXCHANGERS
STEAM JET AIR PUMPS SUPERHEATERS
TUBE STILLS VACUUM PUMPS
WATER COOLED FURNACE SURFACES
BRASS AND COPPER TUBING AND PIPE

HOT WATER

for factories, hotels or any other type of building.

Whitlock Heaters will do the work—and Whitlock Engineers know the problems and can help you.

WHITLOCK
SERVICE WATER
HEATERS

Every demand for hot water in the Hotel Pennsylvania is supplied by Whitlock Heaters.

Whitlock Heaters supply the hot process water in Armour Co.'s plants all over the country.

Write or 'phone our nearest office. One of our Hot Water Engineers will gladly work with you.

New York	Philadelphia	Baltimore	Los Angeles
Boston	Chicago	Detroit	San Francisco

and other principal cities. Consult telephone book.

THE WHITLOCK COIL PIPE COMPANY

40 South Street :: :: Hartford, Conn.

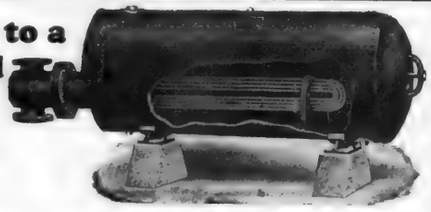
The
GORTON
Single Pipe
Vapor System

EASY TO INSTALL

At last—here is a vapor system that will not only do the work but also is one that is extremely simple. This fact is one of the big secrets of the Gorton System's success. Write and ask us to tell you about it in detail.

GORTON HEATING CORP., 96 LIBERTY STREET NEW YORK CITY
Manufacturers — Established 1887

Built up to a standard —not down to a price

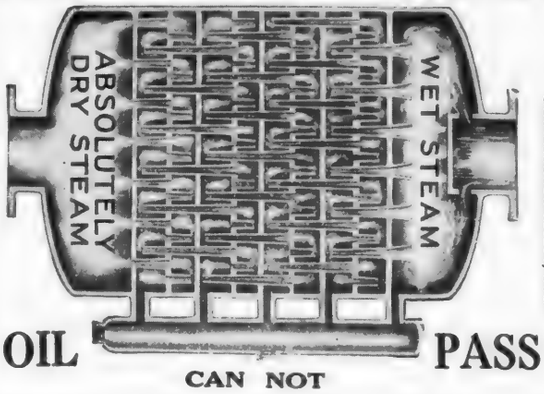


The rapid growth in the sale of O. E. F. storage heaters bears testimony to correctness of design and high standard maintained.

U-tube and straight tube types; steel flange quality; heavy gauge seamless drawn copper tubes; expanded into rolled steel tube sheets. Write for further details.

O. E. Frank Heater & Engineering Co., Inc.
Factory and Offices at Buffalo, N. Y.

OIL OR STEAM SEPARATORS



VERTICAL OR HORIZONTAL
SEND FOR CATALOG
FARNSWORTH COMPANY
CONSHOHOCKEN, PA.

"This is a real housewarming, Ed, because you told us to install a *Newport!*"

"It's great—our house at 70° all the time—and on the coldest days we've put coal in that boiler only once a day. In milder weather just two or three times a week." This feature of the heating convenience not only appeals to the lady of the house but creates economies that strongly appeal to the home owner.

Newport's advertising in national papers is selling the idea—capitalize on it. By using these same arguments you can sell Newport Magazine Feed Boilers. We have a very interesting sales plan, good margin of profits, lots of dealer helps. Better write for them now!

Newport burns coal that costs $5.00 or $7.00 less per ton —No. 1 Buckwheat Coal—It cuts fuel budgets 30 to 50%.

NEWPORT BOILER CO.
Division, Hart-Parr Co.
529 S. Franklin St. - Chicago

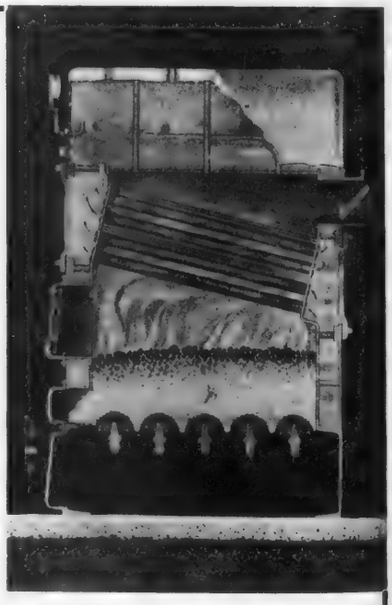
NEWPORT
MAGAZINE FEED
BOILERS

Distributors in all principal cities in U.S. and Canada

COAL
OIL
GAS
BOILERS

ESTABLISHED
1885

Good Boilers Ever Since



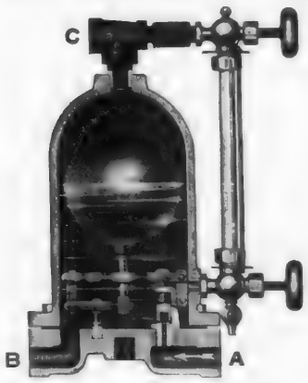
Coal—Oil—Gas Boilers

Now built in larger sizes, including Oil and Gas Boilers up to 8400 feet of steam radiation, and Coal Boilers, both Direct Draft and Smokeless, up to 6000 feet of steam radiation.

Write for Catalogue which tells the complete Knowlton story.

ORR & SEMBOWER, Inc., READING PA.
Chicago, Illinois
208 N. Clinton St.
New York City
50 Church St.

KIELEY



THERE is a Kieley Water Feeder for every service. Free from complicated parts and easy to install and repair, they are chosen where full protection at low cost is desirable.

Kieley & Mueller, Inc.
34 West 13th Street, New York City

Swartwout
Steam Products are GUARANTEED

If a purchaser of any Swartwout Steam Product is not entirely satisfied, he may return the equipment and will be refunded the total purchase price, plus all transportation charges both ways.

Ask for catalogue.

THE SWARTWOUT CO.
18511 Euclid Avenue, Cleveland, Ohio

ANNOUNCING
The Newest and Greatest of All MONROE Oil Pumps

The Years Sensation in the Oil Burner Industry

Entirely New — Progress and Initiative are the watchwords of the leaders in the oil burner industry. Thus it is only natural that a pump such as the New Monroe Type TRU should some day come on the market—and it is also only natural that it should be a Monroe.

Greater Capacity — This new unit pumps 30 gallons of oil per minute—twice the capacity of the former Monroe. It is a rotary action pump of unusually advanced design, quiet and vibrationless — practically inaudible.

Lower Cost — In spite of the many refinements and improvements on this new unit, the price is as low as that of the former Monroe Pump — a triumph of engineering skill and mass production.

Janette Manufacturing Co.
556-558 West Monroe Street
Chicago, Illinois
Dept. H-4

Singer Bldg.
149 Broadway
NEW YORK

Real Estate
Trust Bldg.
PHILADELPHIA

Representatives in Leading Cities

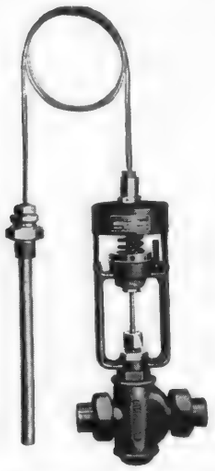
PIN TO YOUR LETTER HEAD

JANETTE MANUFACTURING CO., Dept. H-4,
556-58 West Monroe St., Chicago, Ill.

Gentlemen: You may send me all the facts on your new Type TRU Oil Pump.

Name..... Address..... City..... State.....

Temperature Controllers



American Precision Temperature Controller

for Water Heaters

PRECISION regulation pays. If the temperature is to be controlled at all, then the closer the better. The American Precision Temperature Controller maintains a uniform temperature all the time. There is never any variation. It will regulate to within 1° F. plus or minus. Compare its accuracy.

The heart of a temperature controller is the bellows. The bellows in the American Precision Controller will expand and contract 60 million times before rupturing. That's what gives it long life. Compare its durability.

The American Precision Temperature Controller will make a satisfied client. It will save him money and eliminate trouble. Here is an instrument backed by 78 years of manufacturing experience. It is simple, rugged, self-operated and guaranteed accurate.

Write for Catalog R-14

AMERICAN INSTRUMENTS

SINCE 1851

CONSOLIDATED ASHCROFT HANCOCK CO. INC.
Subsidiary of Manning, Maxwell and Moore, Inc.
100 East 42nd Street, New York City

Stop! Wasteful Hand Firing

Install a

BROWNELL *Underfeed* STOKER

— Save 15 to 50% on your Coal Bill —

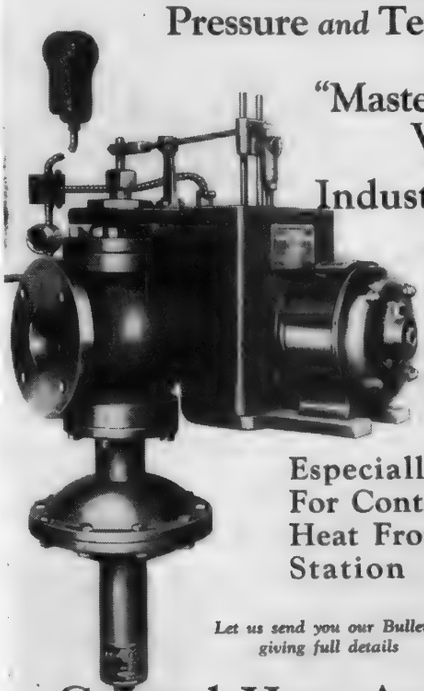
A Brownell automatic underfeed stoker will enable you to burn the cheap grades of coal, utilize all the heat in the smoke and gases that ordinarily go up the flue, and get more heat out of cheap grades than is possible out of high priced coal when hand fired. More uniform heat due to automatic controls. Elimination of smoke, and savings on labor just a few of many other advantages.

Write for stoker bulletin S-50. If interested in boilers, get bulletin B-6-A.

THE BROWNELL COMPANY, Dayton, Ohio
— Offices almost anywhere —

BOILERS — STOKERS
Full Range of Models and Sizes

HORNUNG
Pressure *and* Temperature
2 in 1
"Master Control" Valve
(PATENTED)
Industrial Type



Motor Operated Directly by Thermostat

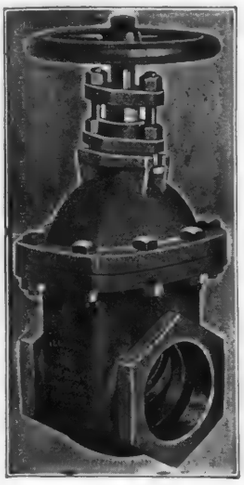
All Relays Eliminated ... ...

Especially Designed For Control of Steam Heat From a Central Station

Let us send you our Bulletin giving full details

Central Heat Appliances
J. C. HORNUNG, *Engineer*
343 South Dearborn Street Chicago, Illinois
(3475)

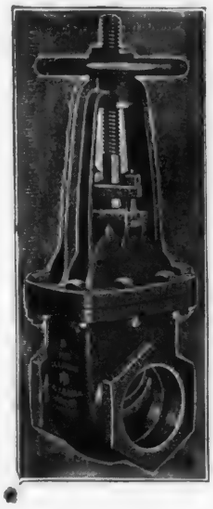
IRON BODY GATE VALVES



SCREWED, FLANGED
AND
HUB END STYLES

NON-RISING STEM
AND
O. S. and Y. PATTERNS

ALSO MANUFACTURERS OF
Cast and Malleable Iron Fittings



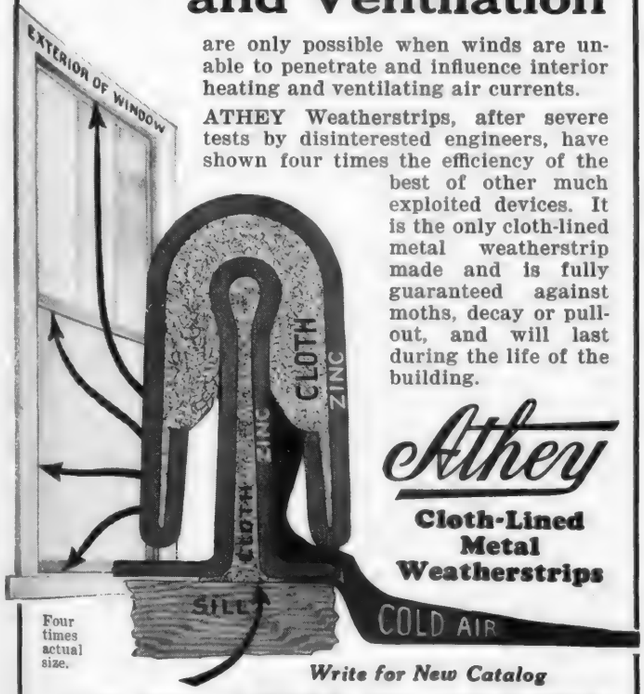
Illinois Malleable Iron Company

1801 Diversey Parkway :-: :-: Chicago, Ill.

Controlled Heat and Ventilation

are only possible when winds are unable to penetrate and influence interior heating and ventilating air currents.

ATHEY Weatherstrips, after severe tests by disinterested engineers, have shown four times the efficiency of the best of other much exploited devices. It is the only cloth-lined metal weatherstrip made and is fully guaranteed against moths, decay or pull-out, and will last during the life of the building.



Four times actual size.

Athey
Cloth-Lined Metal Weatherstrips

Write for New Catalog

The best Heating Engineers plan for sufficient heat with a minimum fuel consumption by Atheyizing all windows of wood or steel.

ATHEY CO., 4047 W. 45th St., CHICAGO

Representatives in Principal Cities
In Canada
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279 Seigneurs St., Montreal, Canada

Davis Regulators get their action from the force of Gravity

It is one force which never fails or varies, so nature is made to serve in the operation of Davis Regulators. This is characteristic of Davis engineering and one reason why you get such good service from Davis Pressure Regulators. First in America – first in efficiency.

G. M. DAVIS REGULATOR CO.
436 Milwaukee Avenue
Chicago, Illinois

DAVIS AUTOMATIC VALVE SPECIALTIES

H&V4-Gray

ENGINEERS' SPECIFICATION INDEX

ACID FUME EXHAUSTERS
Duriron Company, Inc., The, Dayton, O.

AIR COMPRESSORS
American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Nash Engineering Co., So. Norwalk, Conn.
Powers Regulator Co., Chicago, Ill.

AIR CONDITIONING APPARATUS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Grinnell Co., Providence, R. I.
Johnson Service Co., Milwaukee, Wis.
Midwest Air Filters, Inc., Bradford, Pa.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Vilter Mfg. Co., Milwaukee, Wis.
York Heating & Ventilating Corp., Philadelphia, Pa.

AIR COOLING & DRYING SYSTEMS
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
Erie Heating Systems, Inc., Erie, Pa.
General Air Filters Corp., New York.
Ilg Electric Ventilating Co., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Thermal Units Co., Chicago, Ill.
Vilter Mfg. Co., Milwaukee, Wis.

AIR ELIMINATORS
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corporation, New York.
Hoffman Specialty Co., New York.
Marsh & Co., Jas. P., Chicago, Ill.
Sarco Co., Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.

AIR FILTERS
American Blower Co., Detroit, Mich.
Connor Co., Inc., The W. B., New York.
DeBothezat Impeller Co., Inc., New York
General Air Filters Corp., New York.
Midwest Air Filters, Inc., Bradford, Pa.
National Air Filter Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Staynew Filter Corp., Rochester, N. Y.

AIR SEPARATORS
Bishop & Babcock Sales Co., Cleveland, Ohio.
Swartwout Co., Cleveland, Ohio.

AIR WASHERS
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
New York Blower Co., Chicago, Ill.

BELTING
Alexander Bros., Inc., Philadelphia, Pa.

BLOWERS
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
St. Louis, Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

BOILERS, COPPER
Badger & Sons Co., E. B., Boston, Mass.

BLOWERS, FAN
(See Fans, Supply & Exhaust).

BOILERS, HEATING, CAST-IRON, COAL BURNING
American Radiator Co., New York.
Burnham Boiler Corp., Irvington, N. Y.
Combination Boiler Co., Benton Harbor, Mich.
Illinois Malleable Iron Co., Chicago, Ill.
International Boiler Works, East Stroudsburg, Pa.
National Radiator Corp., Johnstown, Pa.
Newport Boiler Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Spencer Heater Corp., Williamsport, Pa.
Weil-McLain Co., Chicago, Ill.

BOILERS, HEATING, DOWN-DRAFT, COAL BURNING
American Radiator Co., Buffalo, N. Y.
Brownell Co., The, Dayton, Ohio.
Fitzgibbons Boiler Co., Inc., New York.
International Boiler Works, East Stroudsburg, Pa.
Kewanee Boiler Corp., Kewanee, Ill.
National Radiator Corp., Johnstown, Pa.
Orr & Sembower Co., Reading, Pa.
Pacific Steel Boilers Corp., Waukegan, Ill.
Page Boiler Co., Wm. H., New York.
Stanwood Corporation, Cincinnati, O.

BOILERS, HEATING, GAS-FIRED
American Gas Products Corp., New York
American Radiator Co., Buffalo, N. Y.
Frost Mfg. Co., Galesburg, Ill.
International Boiler Works, East Stroudsburg, Pa.
National Radiator Corp., Johnstown, Pa.
Orr & Sembower Co., Reading, Pa.
Stanwood Corporation, Cincinnati, O.

BOILERS, HEATING, MAGAZINE FEED
Gorton Heating Corporation, New York.
Newport Boiler Co., Chicago, Ill.
Orr & Sembower Co., Reading, Pa.
Spencer Heater Co., Williamsport, Pa.

BOILERS, HEATING, OIL-FIRED
Bryan Steam Corp., Peru, Ind.
Combination Boiler Co., Benton Harbor, Mich.
International Boiler Works, East Stroudsburg, Pa.
Johnston Bros., Inc., Ferrysburg, Mich.

BOILERS, HEATING, STEEL, COAL-FIRED
Brownell Co., The, Dayton, Ohio.
Coatesville Boiler Works, Coatesville, Pa.
Combination Boiler Co., Benton Harbor, Mich.
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Gorton Heating Corp., New York.
International Boiler Works, East Stroudsburg, Pa.
Heggie-Simplex Boiler Co., Joliet, Ill.
Johnston Bros., Inc., Ferrysburg, Mich.
Kewanee Boiler Corp., Kewanee, Ill.
Monitor Boiler Co., Philadelphia, Pa.
Pacific Steel Boilers Corp., Waukegan, Ill.
Stanwood Corporation, Cincinnati, O.

BOILERS, POWER
Eclipse Fuel Engineering Co., Rockford, Ill.
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Heggie-Simplex Boiler Co., Joliet, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, O.

CALORIMETERS
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.

CIRCULATORS, WATER
Janette Mfg. Co., Chicago, Ill.

COILS, PIPE
Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clow Co., Jas. B., Chicago, Ill.
Crane Co., Chicago, Ill.
Foster Wheeler Corp., New York.
National Pipe Bending Co., New Haven, Conn.
Walworth Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

CONDENSERS
Davis Engineering Corp., New York.
Foster Wheeler Corp., New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

CONDUITS, UNDERGROUND PIPE
American District Steam Co., North Tonawanda, N. Y.
Ric-wiL Co., The, Cleveland, Ohio.

CONVERTERS, HOT WATER
Davis Engineering Corp., New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

COOLERS, AIR
Alberger Heater Co., Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.

COOLERS, OIL
Davis Engineering Corp., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Whitlock Coil Pipe Co., Hartford, Conn.

COOLING TOWERS & PONDS
Badger & Sons Co., E. B., Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Connor Co., Inc., The W. B., New York.
Foster Wheeler Corp., New York.
General Air Filters Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

COVERING, BOILER, PIPE, ETC.
American District Steam Co., North Tonawanda, N. Y.
Crane Co., Chicago, Ill.
Ric-wiL Co., The, Cleveland, Ohio.

DAMPER REGULATORS
(See Regulators, Damper).

DAMPERS, DUCT
Buckeye Blower Co., The, Columbus, O.
Clarage Fan Co., Kalamazoo, Mich.

DEHUMIDIFYING APPARATUS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Johnson Service Co., Milwaukee, Wis.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Philadelphia, Pa.

DISTILLERS (WATER)
Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

DRAFT APPLIANCES, MECHANICAL
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

DRYING SYSTEMS
(See Air Cooling & Drying Systems).

DUST COLLECTING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Reed Air Filter Co., Inc., Louisville, Ky.
Skinner Bros. Mfg. Co., St. Louis, Mo.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.

DUST COLLECTORS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Skinner Bros. Mfg. Co., St. Louis, Mo.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Philadelphia, Pa.

ENGINES, STEAM
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, Ohio.
Clarage Fan Co., Kalamazoo, Mich.
Frost Mfg. Co., Galesburg, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corp., Cincinnati, O.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

EQUALIZING LOOPS
Hoffman Specialty Co., New York.
Sarco Co., Inc., New York.

EVAPORATORS, BOILER FEED MAKE-UP
Buffalo Forge Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Foster Wheeler Corp., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

EXHAUST HEADS
Aeolus Dickinson, Chicago, Ill.
Crane Co., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Swartwout Co., Cleveland, Ohio.

EXHAUST SYSTEMS
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York

EXHAUST SYSTEMS, ACID
Duriron Co., Inc., The, Dayton, O.

EXPANSION JOINTS
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Crane Co., Chicago, Ill.
Foster Wheeler Corp., New York.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Walworth Co., New York.
Webster & Co., Warren, Camden, N. J.

EXPANSION SHELLS
Phillips Drill Co., Chicago, Ill.

FANS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

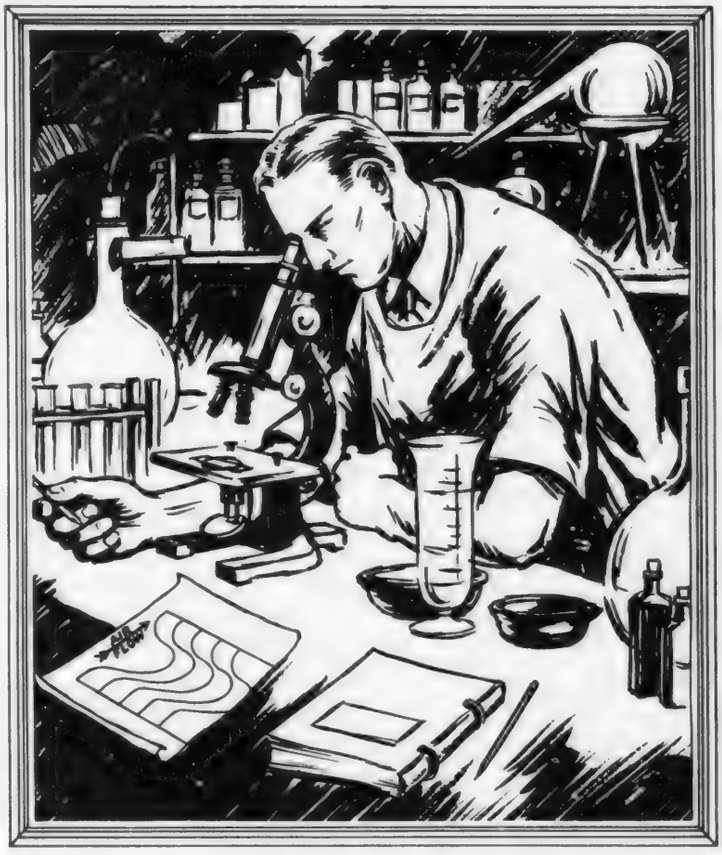
FANS, CENTRIFUGAL
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

FANS, DISC
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
DeBothezat Impeller Co., Inc., New York
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

FANS, PROPELLER
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
DeBothezat Impeller Co., Inc., New York
Emerson Electric Mfg. Co., St. Louis, Mo.
Hartzell Propeller Co., Piqua, Ohio.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

We Put This Question to Our Engineers and Their Answer Was---

"Sinuous CONTROLLED Air Flow"



"How can we produce an air filter in which all duplicate baffles are eliminated—a filter that will remove dust efficiently in a single operation or bending of the air stream, and thereby keep resistance and power costs both at a minimum?"

It is a well known fact that most of the dust in the conventional filter cell is caught upon the baffles which make up the fore part of the medium. The rear or duplicate baffles entrap a much smaller portion, but are nevertheless made necessary by the quantities which escape the first impingement surfaces.

Model SV

Midwest felt that if this maze of secondary baffles which set up so much resistance but which did so very little work, could be eliminated without sacrifice of cleaning efficiency, a vastly better filter medium would result.

The answer, reached by means of pure theoretical and mathematical considerations, was a triumph in hypothetical reasoning. A single sinuous bend of the air was made to do all that countless changes in direction formerly had accomplished. The path of air through the filter medium was shaped along definite, scientific lines and "controlled air flow" became a fact.

Today this new medium is available in the Midwest Vertical Model SV and its advantages are evident in a filter of considerably smaller size and greater capacity.

MIDWEST AIR FILTERS

INCORPORATED

BRADFORD PENNA.

FANS, MULTI-BLADE
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

FANS, STEEL PLATE
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

FEEDERS, BOILER
Cashin Co., W. D., Boston, Mass.
Cissell Mfg. Co., W. M., Louisville, Ky.
Crane Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Walworth Co., New York.

FILTERS, (AERATING)
Davis Engineering Corp., New York.

FILTERS, CRANK CASE OIL
Nugent & Co., Inc., Wm, W., Chicago, Ill.

FILTERS, FEED-WATER
Davis Engineering Corp., New York.

FITTINGS, ACID RESISTING
Crane Co., Chicago, Ill.
Duriron Co., Inc., The, Dayton, O.

FITTINGS, PIPE, COMPRESSION
Nugent & Co., Inc., Wm., W., Chicago, Ill.

FITTINGS, PIPE, FLANGED
Crane Co., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Walworth Co., New York.

FITTINGS, PIPE, SCREWED
Crane Co., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Walworth Co., New York.

FLANGES
Crane Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Walworth Co., New York.

GAS BURNERS
Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.
General Gas Light Co., Kalamazoo, Mich.

GASKETS, ASBESTOS
Crane Co., Chicago, Ill.
Jenkins Bros., New York.

GASKETS, METALLIC
Crane Co., Chicago, Ill.
Jenkins Bros., New York.

GASKETS, RUBBER
Crane Co., Chicago, Ill.
Jenkins Bros., New York.

GAUGE BOARDS
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Clow Co., Jas. B., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

GAUGE GLASSES
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Crane Co., Chicago, Ill.
Jenkins Bros., New York.

GAUGES, ALTITUDE
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.

GAUGES, DRAFT
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

GAUGES, HYDRAULIC
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

GAUGES, OUNCE GRADUATED
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bristol, Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.

GAUGES, PRESSURE
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Cook Electric Co., Chicago, Ill.
Crane Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.

GAUGES, TANK
Cook Electric Co., Chicago, Ill.
King-Seeley Corp., Ann Arbor, Mich.

GAUGES, VACUUM
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Crane Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

GAUGES, VACUUM (COMPOUND)
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

GAUGES, WATER
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Cook Electric Co., Chicago, Ill.
Crane Co., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York.

GENERATOR COOLING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Reed Air Filter Co., Inc., Louisville, Ky.
Schutte & Koerting Co., Philadelphia, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

GOVERNORS (PUMP)
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Webster & Co., Warren, Camden, N. J.

GRATES, DUMPING
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Stanwood Corp., Cincinnati, Ohio.

GRATES, ROCKING
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Stanwood Corp., Cincinnati, Ohio.

GRATES, SHAKING
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Stanwood Corp., Cincinnati, Ohio.

GRATES, SHAKING AND DUMPING
Frost Mfg. Co., Galesburg, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Stanwood Corp., Cincinnati, Ohio.

GRATES, SHAKING, CIRCULAR
Fitzgibbons Boiler Co., Inc., New York.

GRATES, STATIONARY
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Stanwood Corp., Cincinnati, Ohio.

HEAT CABINETS
(See Radiators, Cabinet and Concealed)

HEATERS, AIR, FAN SYSTEM
Aerofin Corp., Newark, N. J.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
Ilg Electric Ventilating Co., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Rome-Turney Radiator Co., Rome, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Thermal Units Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.

HEATERS, DOMESTIC WATER
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Crane Co., Chicago, Ill.
Davis Engineering Corp., New York.
Excelso Products Corp., Buffalo, N. Y.
Foster Wheeler Corp., New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Monitor Boiler Co., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., The, Erie, Pa.
Weil-McLain Co., Chicago, Ill.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, ELECTRICAL UNIT
American Blower Co., Detroit, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.

HEATERS, FEED WATER, (CLOSED)
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Foster Wheeler Corp., New York.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Frost Mfg. Co., Galesburg, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., The, Erie, Pa.
Stanwood Corp., Cincinnati, Ohio.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, FEED WATER (OPEN)
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Stanwood Corp., Cincinnati, Ohio.
Webster & Co., Warren, Camden, N. J.

HEATERS, FUEL-OIL
Alberger Heater Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Davis Engineering Corp., New York.
Electrol, Inc., St. Louis, Mo.
Excelso Products Corp., Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
National Air Filter Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, UNIT
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
Erie Heating Systems, Inc., Erie, Pa.
Ilg Electric Ventilating Co., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilation Co., Inc., Bridgeport, Conn.
Skinner Bros. Mfg. Co., St. Louis, Mo.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Thermal Units Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Philadelphia, Pa.
Young Radiator Co., Racine, Wis.

HEATING SYSTEMS, VACUUM
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Sarco Co., Inc., New York.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

HEATING SYSTEMS, VAPOR
American District Steam Co., North Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corporation, New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

HEATING SYSTEMS, WATER
American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Grinnell Co., Providence, R. I.
Hornung, J. C., Chicago, Ill.
Mueller Co., Decatur, Ill.
Page Boiler Co., Wm., H., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Spencer Heater Co., Williamsport, Pa.

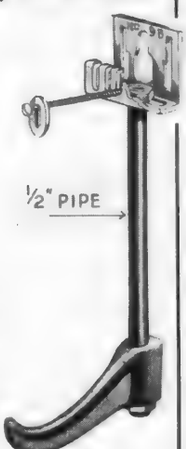
HUMIDIFIERS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Grinnell Co., Providence, R. I.
Johnson Service Co., Milwaukee, Wis.
Lewis Corporation, Minneapolis, Minn.
National Air Filter Co., Chicago, Ill.
Schleicher, Inc., Gary, Ill.
National Regulator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Philadelphia, Pa.

HUMIDITY CONTROL
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Foxboro Co., Inc., The, Foxboro, Mass.
Grinnell Co., Providence, R. I.
Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.

INSTRUMENTS, ELECTRIC MEASURING
Bristol Co., The, Waterbury, Conn.

INSTRUMENTS, INDICATING AND RECORDING
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

E-Z RADIATOR HANGER



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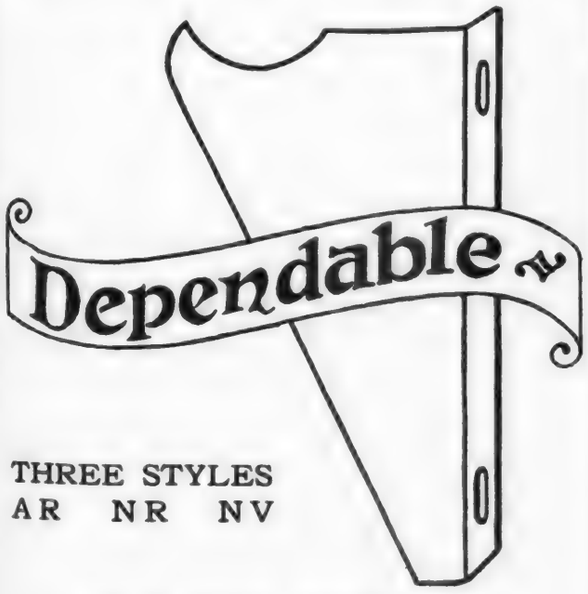

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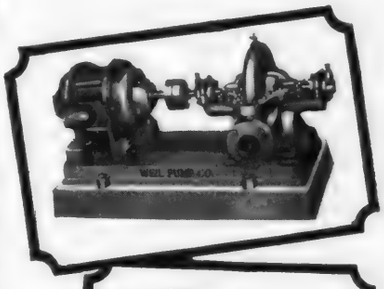
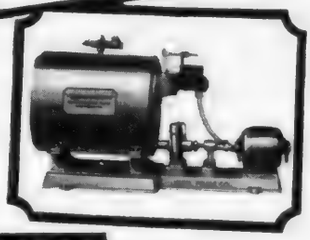
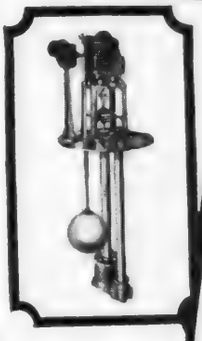


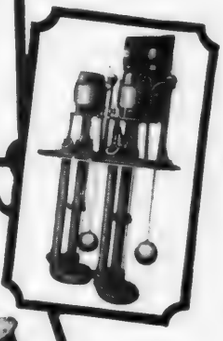
Weil Type "A" Ball Bearing, Single Stage, Double Suction, Horizontally Split Case Pump. Fully bronze fitted. Write for Bulletin A-1800.



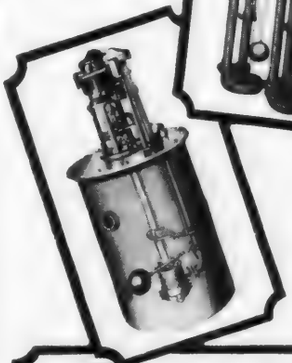
Weil "Tujur" Horizontal Condensation Pump—a "bear" for service — reasonable in cost. Write for Bulletin TR-100.



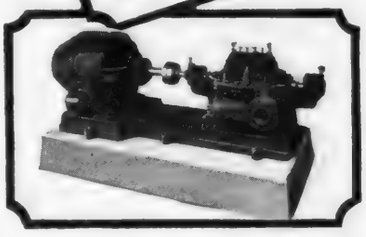
Weil Automatic Bilge Pump—heavy duty type—unmatched for durable service. Write for Bulletin B-700.



Weil Automatic Duplex Non-Clog Sewage Ejectors (screenless.) (Latest and most efficient ejector made. Write for Bulletin CN-900.



Weil Type "NRG" Vertical Condensation Pump and Receiver. Compact and efficient. Write for Bulletin NRG-200.



Weil Type "EM" Multi-Stage Pump—opposed suction eliminates end thrust. Ball bearing—greater efficiency — lower maintenance cost. Write for Bulletin E-1900.

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INSULATION, BOILER, PIPE, ETC.
(See Covering, Boiler, Pipe, etc.)

INSULATION, BUILDING
Celotex Co., Chicago, Ill.
Flax-li-num Insulating Co., St. Paul, Minn.
Insulite Co., Minneapolis, Minn.

KETTLES, COPPER
Badger & Sons Co., E. B., Boston, Mass.

MANOMETERS
American Blower Co., Detroit, Mich.
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.

MECHANICAL DRAFT APPLIANCES
(See Draft Appliances, Mechanical)

METALS, THERMOSTATIC
Chace Valve Co., W. M., Detroit, Mich.

METERS, CONDENSATION
American District Steam Co., North Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.

METERS, FEED WATER
Central Station Steam Co., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

METERS, FLOW
Foxboro Co., Inc., The, Foxboro, Mass.

METERS, PITOT TUBE
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.

METERS, STEAM
American District Steam Co., North Tonawanda, N. Y.

MOTORS (ELECTRIC)
Baldor Electric Co., St. Louis, Mo.
Century Electric Co., St. Louis, Mo.
Emerson Electric Mfg. Co., St. Louis, Mo.
Janette Mfg. Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

NOZZLES, ACID RESISTING
Duriron Co., Inc., The, Dayton, O.

NOZZLES, SPRAY
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

OIL BURNERS
American Nokol Corp., Chicago, Ill.
Electrol Inc., St. Louis, Mo.
Hardinge Bros., Inc., Chicago, Ill.
Johnson Co., S. T., Oakland, Cal.
May Oil Burner Co., Baltimore, Md.
McIlvaine Burner Corp., Chicago, Ill.
Pascoe Co., The Wm. H., Chicago, Ill.
Preferred Oil Burners, Inc., Peoria, Ill.

OIL BURNER EQUIPMENT
American Steam Pump Co., Battle Creek, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Hornung, J. C., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Johnston Brothers, Inc., Ferrysburg, Mich.
Schutte & Koerting Co., Philadelphia, Pa.

OIL BURNER IGNITION AND CONTROL EQUIPMENT
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Penn Electric Switch Co., Des Moines, Iowa.
Temperature Control Co., Chicago, Ill.
Time-O-Stat Controls Co., Elkhart, Ind.
White Mfg. Co., St. Paul, Minn.

OZONE APPARATUS
United States Ozone Co. of America, Scottdale, Pa.

PIPE, ACID-RESISTING
Duriron Co., Inc., The, Dayton, O.

PIPE BENDING
Badger & Sons Co., E. B., Boston, Mass.
Clow Co., Jas. B., Chicago, Ill.
Crane Co., Chicago, Ill.
Grinnell Co., Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Walworth Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (WOOD)
American District Steam Co., North Tonawanda, N. Y.

PIPE, CAST-IRON
American Radiator Co., New York.
Clow Co., Jas. B., Chicago, Ill.

PIPE HANGERS
Clow Co., Jas. B., Chicago, Ill.
Crane Co., Chicago, Ill.
Grinnell Co., Providence, R. I.
Walworth Co., New York.

PIPE THREADING & CUTTING MACHINES
Crane Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.

PIPE, STEEL
Clow Co., Jas. B., Chicago, Ill.
Crane Co., Chicago, Ill.
National Tube Co., Pittsburgh, Pa.

PRESSURE REDUCING VALVES
(See Regulators, Pressure).

PULLEYS, VARIABLE SPEED
Horton Mfg. Co., Minneapolis, Minn.

PUMPS, ACID RESISTING
Duriron Co., Inc., The, Dayton, O.

PUMPS, CENTRIFUGAL
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Foster Wheeler Corp., New York.
Nash Engineering Co., So. Norwalk, Conn.
Trane Co., The, LaCrosse, Wis.
Weil Pump Co., Chicago, Ill.

PUMPS, CENTRIFUGAL, VACUUM HEATING
Ames Pump Co., New York.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
Weil Pump Co., Chicago, Ill.

PUMPS, CONDENSATION
American Steam Pump Co., Battle Creek, Mich.
Ames Pump Co., New York.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Eclipse Fuel Engineering Co., Rockford, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Weil Pump Co., Chicago, Ill.

PUMPS, OIL
Connor Co., Inc., The W. B., New York.
Janette Mfg. Co., Chicago, Ill.
Nugent & Co., Inc., Wm. W., Chicago, Ill.

PUMPS, RECIPROCATING STEAM
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.

PUMPS, SUMP
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Weil Pump Co., Chicago, Ill.

PUMPS, TURBINE
Foster Wheeler Corp., New York.
Nash Engineering Co., So. Norwalk, Conn.

PUMPS, VACUUM
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Foster Wheeler Corp., New York.
Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
Weil Pump Co., Chicago, Ill.

RADIATOR ENCLOSURES AND SHIELDS
American Metal Products Corporation, St. Louis, Mo.
Schleicher, Inc., Gary, Ill.

RADIATOR HANGERS
American Radiator Co., Buffalo, N. Y.
Clow Co., Jas. B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Co., St. Paul, Minn.
Kewanee Boiler Corp., Kewanee, Ill.
McAlear Mfg. Co., Chicago, Ill.

RADIATORS, CABINET AND CONCEALED
Circulair Heat, Inc., Louisville, Ky.
Clow Co., Jas. B., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Rome Brass Radiator Corp., New York.
Schleicher, Inc., Gary, Ill.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.
Thermal Units Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

RADIATORS, CAST-IRON
American Radiator Co., Buffalo, N. Y.
Burnham Boiler Corp., Irvington, N. Y.
Crane Co., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
National Radiator Corp., Johnstown, Pa.
Nelson Corp., Herman, The, Moline, Ill.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
U. S. Radiator Corp., Detroit, Mich.

RADIATORS, GAS HEATED
Clow Co., Jas. B., Chicago, Ill.
General Gas Light Co., Kalamazoo, Mich.

RECEIVERS, AIR
Brownell Co., The, Dayton, Ohio.
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

RECEIVERS, CONDENSATION
American District Steam Co., North Tonawanda, N. Y.
American Steam Pump Co., Battle Creek, Mich.
Connor Co., Inc., The W. B., New York.
Crane Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Schutte & Koerting Co., Philadelphia, Pa.

REFRIGERATING APPARATUS
Vilter Mfg. Co., Milwaukee, Wis.

REGULATORS, BOILER-FEED
Atlas Valve Co., Newark, N. J.
Cissell Mfg. Co., W. M., Louisville, Ky.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

REGULATORS, DAMPER
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Atlas Valve Co., Newark, N. J.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Gorton Heating Corp., New York.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Sheer Co., H. M., Quincy, Ill.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Sterling Engineering Co., Milwaukee, Wis.
Temperature Control Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
White Mfg. Co., St. Paul, Minn.
Wing Mfg. Co., L. J., New York.

REGULATORS, PRESSURE
American District Steam Co., North Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kainer & Company, Chicago, Ill.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.

REGULATORS, TEMPERATURE
(See Temperature Control)

SEPARATORS, OIL
Bishop & Babcock Sales Co., Cleveland, Ohio.
Crane Co., Chicago, Ill.
Farnsworth Co., Conshohocken, Pa.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Webster & Co., Warren, Camden, N. J.

SEPARATORS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Crane Co., Chicago, Ill.
Farnsworth Co., Conshohocken, Pa.
Illinois Engineering Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Swartwout Co., Cleveland, Ohio.
Webster & Co., Warren, Camden, N. J.

SPRAY COOLING SYSTEMS
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

SPRAY NOZZLES
(See Nozzles, Spray)

STOKERS, MECHANICAL
General Stoker Corp., New York.

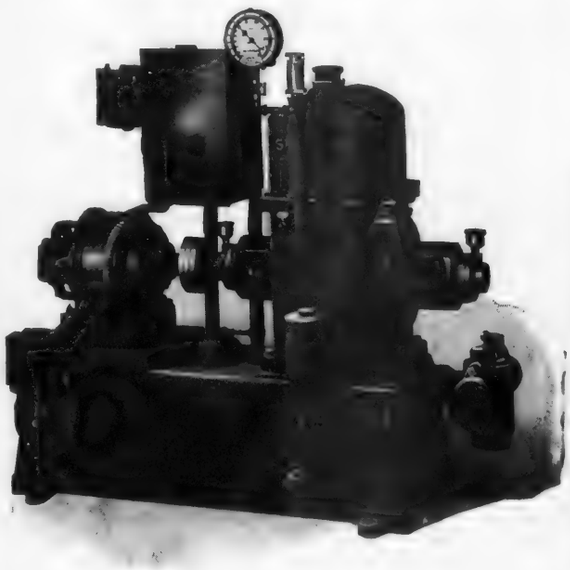
STRAINERS, OIL
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Nugent & Co., Inc., Wm. W., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.

STRAINERS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.

STRAINERS, WATER
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.

TEMPERATURE CONTROL
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The, Foxboro, Mass.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mercoid Corporation, Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Penn Electric Switch Co., Des Moines, Raymond, F. I., Chicago, Ill.
Sarco Co., Inc., New York.
Sheer Co., H. M., Quincy, Ill.
Sterling Engineering Co., Milwaukee, Wis.
Teeple Co., L. R., Portland, Ore.
Temperature Control Co., Chicago, Ill.
Time-O-Stat Controls Co., Elkhart, Ind.
Trane Co., The, LaCrosse, Wis.
White Mfg. Co., St. Paul, Minn.

SKIDMORE



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high or low water line in the system when operating on float control?

The Skidmore pump on interceptor base is designed to give low water line operation without pitting.

The unit is self contained, ball bearing, and operated by one motor. It produces vacuum on the system even when operating on float control, a desirable feature.

The unit consists of two pumps in one housing on one shaft, an air pump and a centrifugal pump for boiler feed. Motor and pump are mounted directly on interceptor base. This construction means compactness in design and minimum floor space occupied.

The automatic starter together with vacuum regulator and float switch are mounted on this unit. All wiring is installed at the factory.

Bulletin No. 6 *illustrating this unit is now available.*

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General Offices and Factory

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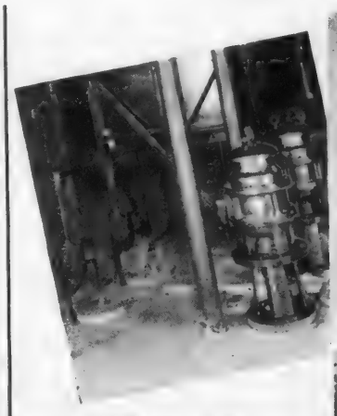
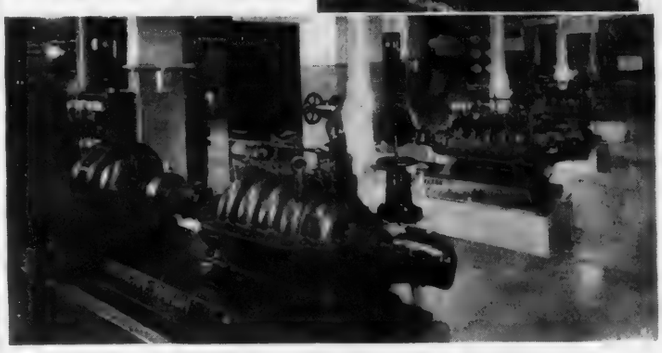
Representatives in principal cities

Canadian Representatives, Darling Bros., Limited
120 Prince Street, Montreal



ABOVE: Two SEM Bilge Pumps delivering sewage and drainage from basement to sewer levels.



Four NM Multi-stage Centrifugal Pumps delivering water from closed surge tanks to open tanks on 13th and 23rd floors.

In Cleveland- *at the* Ohio Bell Telephone Co.

all pumps for cold and hot water circulating, for sewage handling and for brine handling in connection with refrigeration are American-Marsh Pumps. The architects and engineers were Hubbell & Benis, Cleveland; the contractors, Smith-Oby Co., also of Cleveland. When you select American-Marsh Pumps you have chosen as fine equipment as is produced. Our entire energies and resources are devoted toward the perfection of this one product—*pumps.* As a result we can show you very favorable efficiencies, important features of design not found elsewhere, and a ruggedness of construction that means dependable operation despite the severity of service conditions.

If we are not receiving your inquiries at present, you will do well to include American-Marsh when you next need *any* type of pumps. Write for Bulletins.

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AMERICAN STEAM PUMP COMPANY
BATTLE CREEK, MICHIGAN, U. S. A.
Sales Engineers in all of the Important Cities

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American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bristol Co., The Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Powers Regulator Co., Chicago, Ill.

THERMOSTATS

American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Johnson Service Co., Milwaukee, Wis.
Mercoid Corporation, Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Sheer Co., H. M., Quincy, Ill.
Temperature Control Co., Chicago, Ill.
Time-O-Stat Controls Co., Elkhart, Ind.
White Mfg. Co., St. Paul, Minn.

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Crane Co., Chicago, Ill.
Swartwout Co., Cleveland, Ohio.
Trerice Co., H. O., Detroit, Mich.

TRAPS, FLOAT

Connor Co., Inc., The W. B., New York.
Crane Co., Chicago, Ill.
General Air Filters Corp., New York.
Sarco Co., Inc., New York.
Swartwout Co., Cleveland, Ohio.

TRAPS, FLOAT & THERMOSTATIC

Dunham Co., C. A., Chicago, Ill.

TRAPS, INVERTED BUCKET (STEAM AND AIR)

Armstrong Machine Wks., Three Rivers, Mich.

TRAPS, LIFTING

Crane Co., Chicago, Ill.
Lytton Mfg. Corp., Franklin, Va.
Swartwout Co., Cleveland, Ohio.

TRAPS, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
Armstrong Machine Wks., Three Rivers, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Crane Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

TRAPS, RETURN

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Crane Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Sterling Engineering Co., Milwaukee, Wis.
Swartwout Co., Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

TRAPS, STEAM

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Clow Co., Jas. B., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Crane Co., Chicago, Ill.
Davis Engineering Corp., New York.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Trerice Co., H. O., Detroit, Mich.

TRAPS, VACUUM

American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Crane Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Swartwout Co., Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

TUBING, COPPER AND BRASS

Crane Co., Chicago, Ill.
Wolverine Tube Co., Detroit, Mich.

TURBINES, STEAM

Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

TURBO-BLOWERS

Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

UNIT HEATERS

(See Heaters, Unit)

VACUUM CLEANING APPARATUS

American Radiator Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

VALVES, ACID RESISTING

Crane Co., Chicago, Ill.
Duriron Co., Inc., The, Dayton, O.

VALVES, AIR, AUTOMATIC

American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Crane Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm., H., New York.
Powers Regulator Co., Chicago, Ill.
Russell & Co., W. A., New York.

VALVES, AIR RELIEF

American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Gorton Heating Corp., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Trane Co., The, LaCrosse, Wis.

VALVES, BACK PRESSURE

Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York.

VALVES, BALANCED

Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.

VALVES, BLOW-OFF

Crane Co., Chicago, Ill.
Jenkins Bros., New York.
Lytton Mfg. Corp., Franklin, Va.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York.

VALVES, CHECK

Crane Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York.

VALVES, FLOAT

Atlas Valve Co., Newark, N. J.
Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Time-O-Stat Controls Co., Elkhart, Ind.

VALVES, GATE

American District Steam Co., North Tonawanda, N. Y.
Crane Co., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Dunkirk, N. Y.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York.

VALVES, GLOBE, ANGLE & CROSS

Crane Co., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh Valve Co., Dunkirk, N. Y.
National Radiator Corp., Johnstown, Pa.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York.

VALVES, HYDRAULIC-OPERATING

Crane Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Walworth Co., New York.

VALVES, MAGNETIC

Time-O-Stat Controls Co., Elkhart, Ind.

VALVES, NON-RETURN

Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York.

VALVES, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Crane Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Gorton Heating Corp., New York.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Walworth Co., New York.
Webster & Co., Warren, Camden, N. J.

VALVES, PRESSURE REDUCING

(See Regulators, Pressure)

VALVES, REGULATING

Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kainer & Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Walworth Co., New York.

VALVES, RELIEF (WATER)

American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Crane Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Kainer & Co., Chicago, Ill.
Kennedy Valve Mfg. Co., Elmira, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Radiator Corp., Johnstown, Pa.

VALVES, SAFETY

American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Div., Consolidated Ashcroft Hancock Co., Inc., Brooklyn, N. Y.
Crane Co., Chicago, Ill.
Jenkins Bros., New York.
Kennedy Valve Mfg. Co., Elmira, N. Y.
National Radiator Corp., Johnstown, Pa.
Time-O-Stat Controls Co., Elkhart, Ind.
Walworth Co., New York.

VALVES, STOP AND CHECK

(See Valves, Non-Return).

VENTILATING SYSTEMS

American Blower Co., Detroit, Mich.
American Radiator Co., Buffalo, N. Y.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York
General Air Filters Corp., New York.
Ilg Electric Ventilating Co., Chicago, Ill.
Nelson Corp., Herman, The, Moline, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo.
St. Louis Blow Pipe & Heater Co., Inc., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

VENTILATING SYSTEMS, ACID

Duriron Co., Inc., The, Dayton, O.

VENTILATORS

Bayley Blower Co., Milwaukee, Wis.
DeBothezat Impeller Co., Inc., New York
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

VENTILATORS, FLOOR

Aeolus Dickinson, Chicago, Ill.
American Blower Co., Detroit, Mich.
American Metal Products Corporation, St. Louis, Mo.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Knowles Mushroom Ventilator Co., New York.
Ventilating Products Co., Chicago, Ill.

VENTILATORS, ROOF

Aeolus Dickinson, Chicago, Ill.

VENTILATORS, UNIT

American Blower Co., Detroit, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Nelson Corp., Herman, The, Moline, Ill.
Peerless Unit Ventilation Co., Inc., Bridgeport, Conn.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

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WEATHER STRIPS, METAL

Athey Co., Chicago, Ill.

WRENCHES, STILLSON

Walworth Co., New York.

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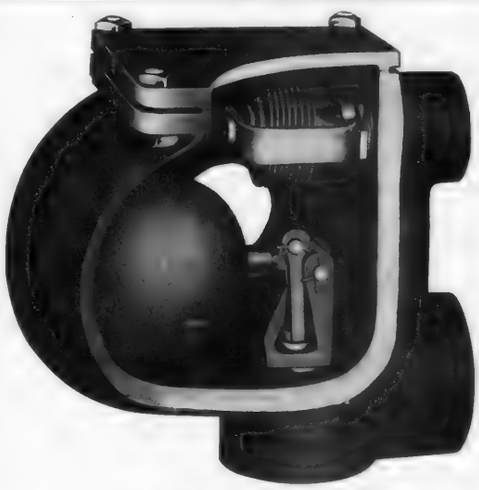

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Send for Bulletin No. 52 A.

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35 HARTFORD ST., BOSTON, MASS.

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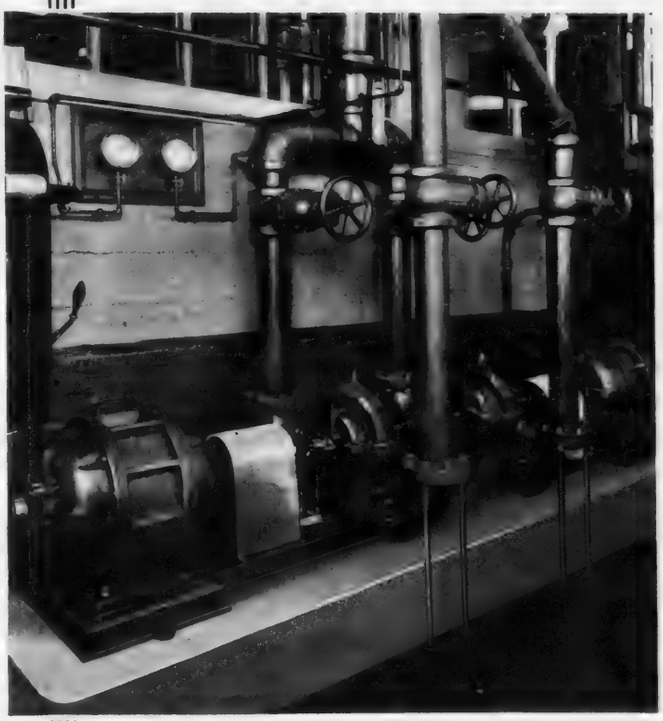

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"Buffalo" *Pumps for every purpose*

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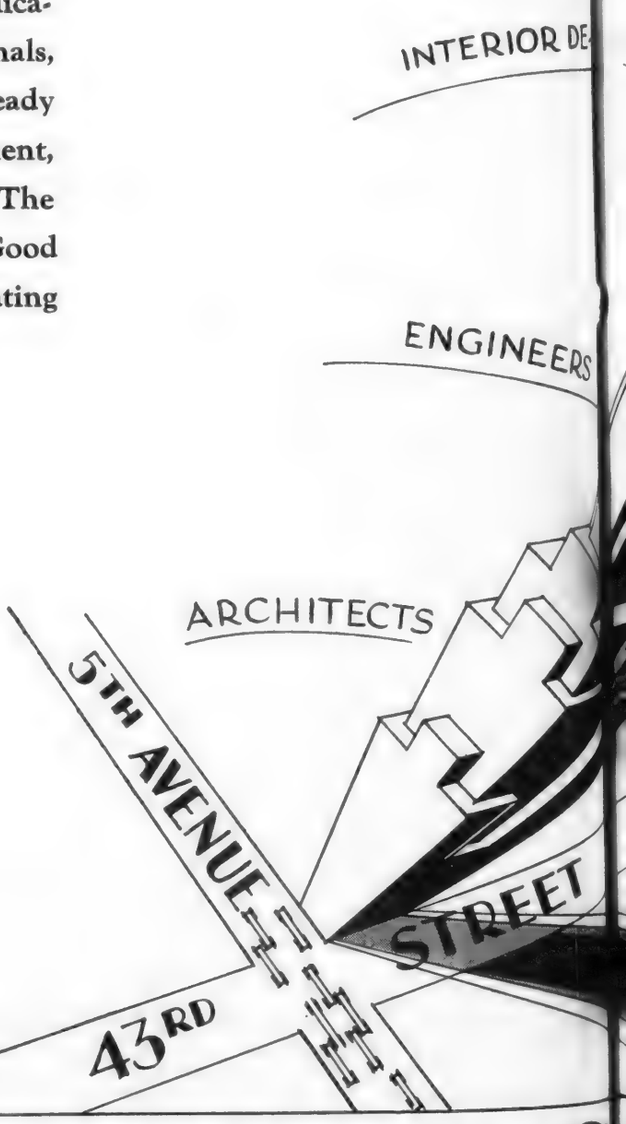
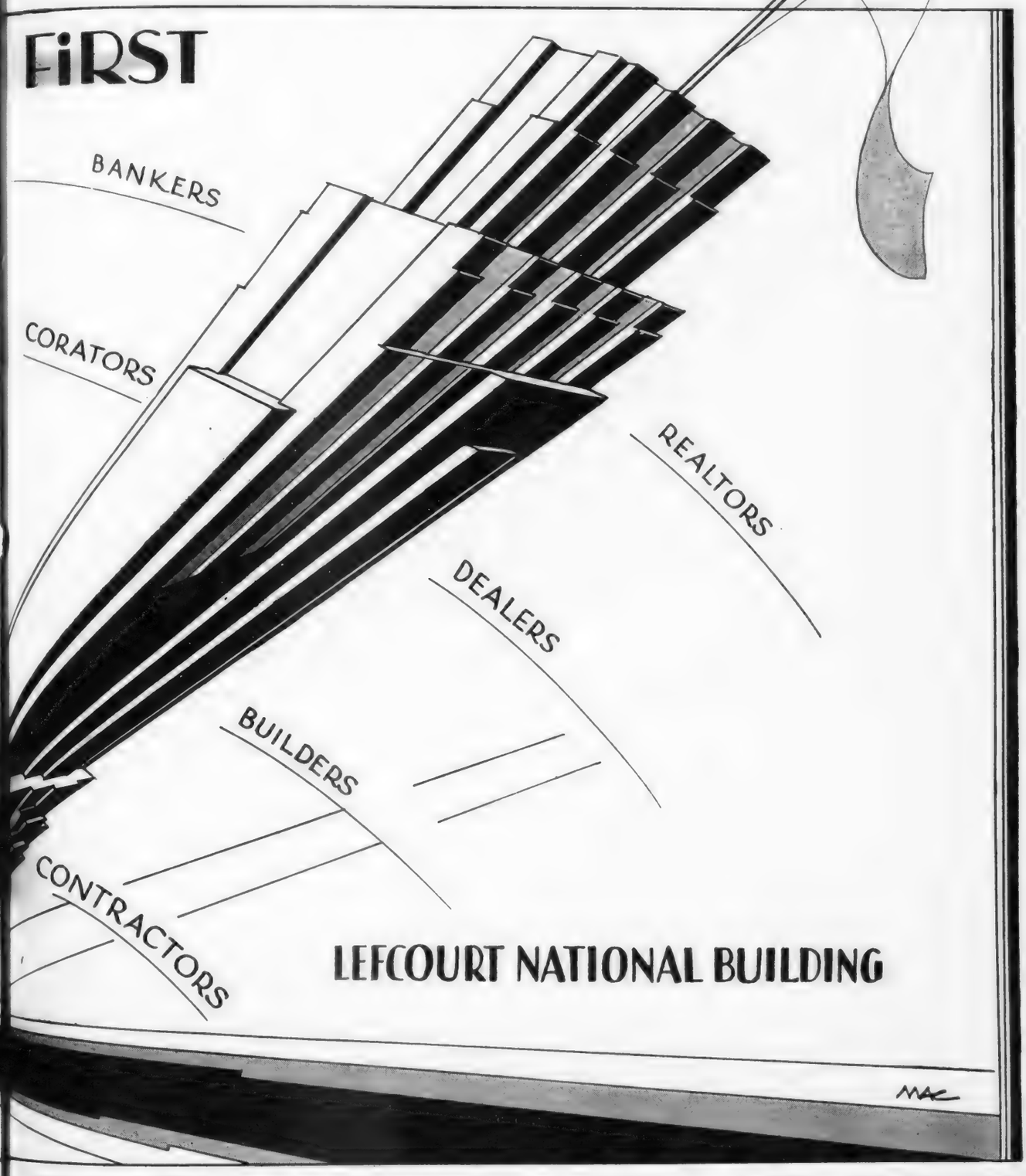


NATIONAL BUILDING

NOTICE



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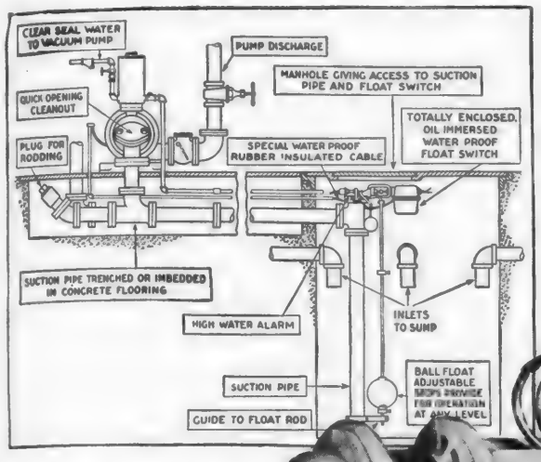
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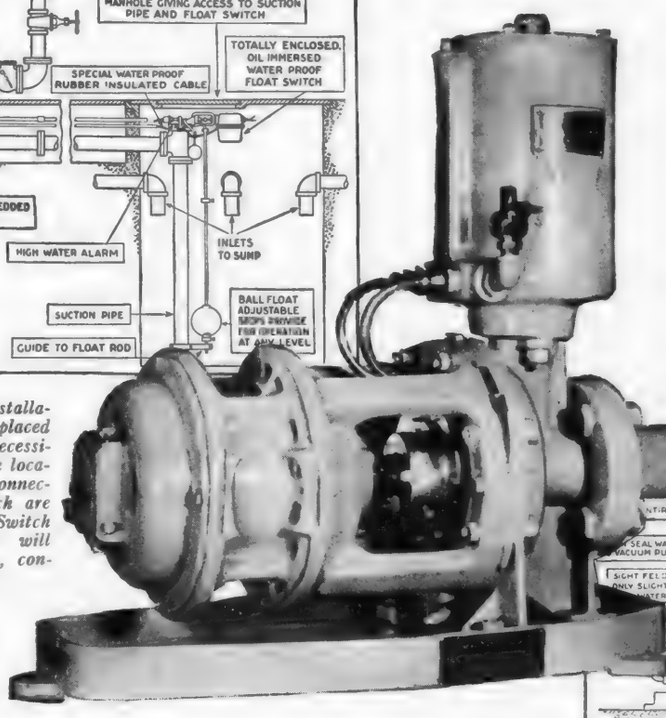
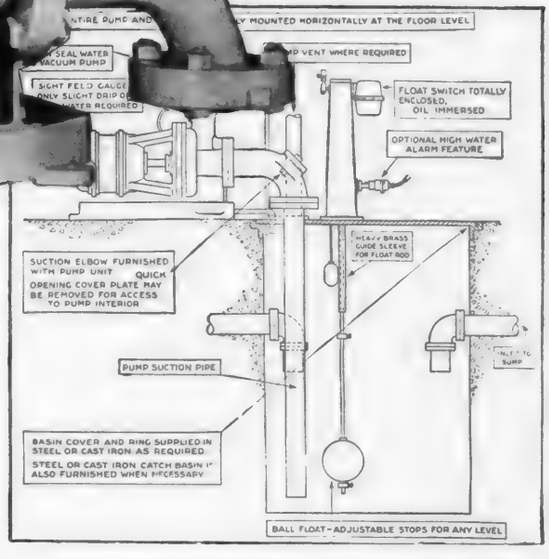
INLETS TO SUMP
HIGH WATER ALARM
BALL FLOAT ADJUSTABLE STOPS PROVIDE FOR OPERATION AT ANY LEVEL
SUCTION PIPE
GUIDE TO FLOAT ROD

In the Type "A" installation, the pump is placed where conditions necessitate, regardless of the location of pit. Pump connections and float switch are below cover of pit. Switch is water-proof and will operate under water, continually, if necessary.



Jennings Suction Sump Pumps are furnished in capacities ranging from 30 to 250 g.p.m. Heads up to 60 ft.


MOUNTED HORIZONTALLY AT THE FLOOR LEVEL
VENT WHERE REQUIRED
SEAL WATER VACUUM PUMP
FLOAT SWITCH TOTALLY ENCLOSED, OIL IMMERSED
OPTIONAL HIGH WATER ALARM FEATURE
HEAVY BRASS GUIDE SLEEVE FOR FLOAT ROD
SUCTION ELBOW FURNISHED WITH PUMP UNIT QUICK OPENING COVER PLATE MAY BE REMOVED FOR ACCESS TO PUMP INTERIOR
PUMP SUCTION PIPE
BASIN COVER AND RING SUPPLIED IN STEEL OR CAST IRON AS REQUIRED
STEEL OR CAST IRON CATCH BASIN IF ALSO FURNISHED WHEN NECESSARY
BALL FLOAT—ADJUSTABLE STOPS FOR ANY LEVEL

If it is permissible to mount the float switch above the pit cover, Type "B" installation with the conventional arrangement of sump pump and controls at the pit is recommended.

you can put this sump pump where you want it . . . .

The entire pumping assembly of the Jennings Suction Sump Pump is above the pit. Only the suction pipe is submerged. As a result, the pump is always accessible.

This convenient arrangement is made possible by simply building into the pump a Nash Hytor Vacuum unit. Thus the pump is made self-priming, and will not air-bind. Instead, air and gas can be handled continually along with the water being pumped.

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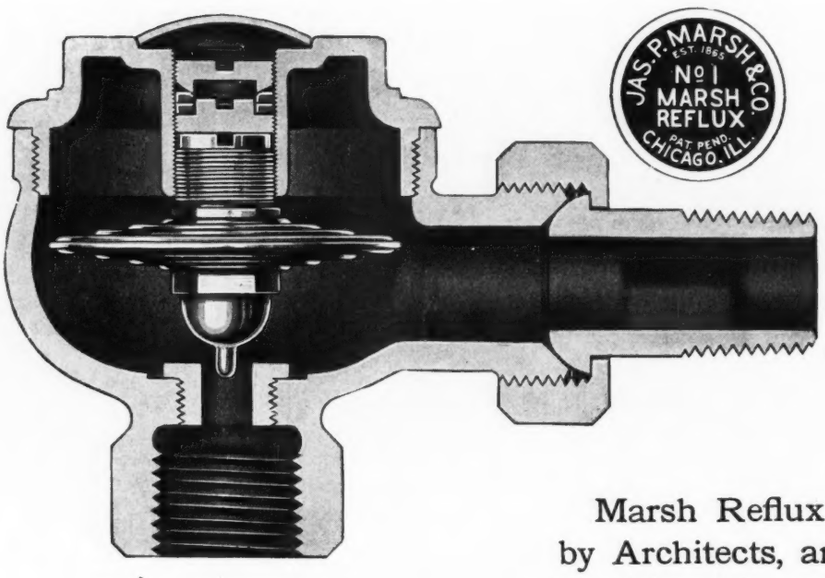

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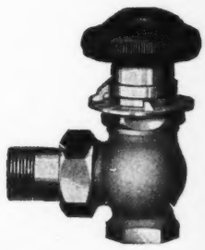

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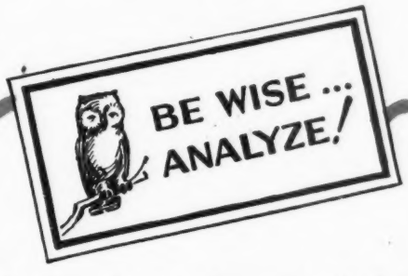
They *appear* alike. But their inside goodness may differ vastly. So you can't be sure ...until you open them and see what's inside.



The same thing is often true of boilers. On casual examination, their construction may *appear* much alike. But when you "open them up," their inside goodness may differ widely. So the alert steam fitter today *analyzes*. And we are glad he does.

Take the Weil-McLain Jacketed Boiler as an example. When he analyzes this boiler

... ***for fuel combustion,*** he finds that all grates in the fire box are shaking grates; he also finds rounded "live fire" corners in the fire box and added combustion space.

... ***for heat utilization,*** he finds *balanced* back-and-forth fire travel; with no short cuts to the chimney under *any* condition; besides, he finds extra heating surface at every point.

... ***for owner's convenience,*** he finds an extra high ashpit; automatic draft regulation; and convenient front control of the choke damper.

... ***for meeting modern fuel trends,*** he finds extra fuel capacity for handling coke; also larger water spaces and large nipple openings for free circulation to utilize the quick heat from oil burners.

... ***for easy installation,*** he finds individual tie rods for assembly of sections; two conveniently located washout plugs; a skimming or blow off plug; provision for hot water coil and indirect water heater; doors securely hung on separate frames; no parts attached to boiler with bolts that *screw* into cored castings.

In short, when you analyze Weil-McLain Boilers, you see evidences at every hand of scientific research, skillful engineering, and careful thought for users of the boilers, as well as for the heating contractor who installs them. They are supremely efficient.

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